From:	Contreras, Peter
To:	Werntz, James; Kenney, James
Cc:	Osborne, Evan; Bellovary, Chris
Subject:	FW: Injection Well Application
Date:	Friday, August 18, 2017 8:49:24 AM

FYI.

Peter Contreras | Ground Water Unit | EPA Region 10 Seattle | 206 553 6708

From: Contreras, Peter
Sent: Friday, August 18, 2017 8:48 AM
To: 'Michael Christian' <mchristian@mch-lawyer.com>; Richard Brown <richard@weiserbrown.email>
Cc: Ronda Louderman <rlouderman@AltaMesa.net>; Dale R. Hayes <dhayes@AltaMesa.net>; David Pepper <dpepper@AltaMesa.net>
Subject: RE: Injection Well Application

Thanks for the update. Have a good weekend.

Peter Contreras | Ground Water Unit | EPA Region 10 Seattle | 206 553 6708

From: Michael Christian [mailto:mchristian@mch-lawyer.com]
Sent: Friday, August 18, 2017 8:43 AM
To: Richard Brown <richard@weiserbrown.email>; Contreras, Peter <Contreras.Peter@epa.gov>
Cc: Ronda Louderman <rlouderman@AltaMesa.net>; Dale R. Hayes <dhayes@AltaMesa.net>; David Pepper <dpepper@AltaMesa.net>
Subject: RE: Injection Well Application

Peter, the landowner on whose land the candidate wells are located has requested that we use a different well than we originally anticipated. As a consequence, we need to go back and rework our permit application materials a little. We are working on that as rapidly as we can, and I'm hopeful we can complete that by end of next week.

Thanks,
Mike

Michael Christian
Marcus, Christian, Hardee & Davies LLP
737 N. 7th St.
Boise, ID 83702
(208) 342-3563
(208) 342-2170 (fax)

From: Richard Brown [mailto:richard@weiserbrown.email]
Sent: Thursday, August 17, 2017 12:29 PM
To: Contreras, Peter
Cc: Ronda Louderman; Dale R. Hayes; Michael Christian
Subject: Re: Injection Well Application

Peter -I appreciate the heads up -I know Ronda had forwarded it to our attorney for a last review - hopefully it got out the door to you in the last couple of days but I'm verifying with Michael?

Sent from my iPhone

On Aug 17, 2017, at 12:22 PM, Contreras, Peter <Contreras.Peter@epa.gov> wrote:

> Hi Richard,
>
> I wanted to confirm your time line and our last communications before I head out of the office (b) (6) [redacted] work travel for the remainder of the month.
>
> I haven't received a permit application yet and you indicated one might be coming soon. I wanted to be sure something didn't get lost or miscommunicated. EPA is continuing to coordinate with Idaho. We expect a response from IDWR to our last letter dated July 28, 2017, to determine what role EPA will have in supporting oil and gas activities in Idaho. My understanding is our attorney was going to share a copy of EPA's letter with Michael Christian for your information, but if that didn't happen for any reason, let me know, and I can forward a copy to you directly.
>
> Thanks,
>
> Peter
>
> Peter Contreras | Ground Water Unit | EPA Region 10 Seattle | 206 553 6708
>
> ---
>
> **From:** Richard Brown [mailto:richard@weiserbrown.email]
> **Sent:** Tuesday, August 08, 2017 12:57 PM
> **To:** Contreras, Peter <Contreras.Peter@epa.gov>
> **Cc:** Ronda Louderman <rlouderman@AltaMesa.net>; Dale R. Hayes <dhayes@AltaMesa.net>
> **Subject:** RE: Injection Well Application

Thanks Peter

```
Richard Brown, Weiser-Brown Oil Co.
Snake River Oil and Gas LLC
Cell/Office 713-818-6856
```
RB-WeiserBrown@comcast.net

From: Contreras, Peter [mailto:Contreras.Peter@epa.gov]
Sent: Tuesday, August 08, 2017 2:11 PM
To: Richard Brown <richard@weiserbrown.email>
Cc: Michael Christian <mchristian@mch-lawyer.com>; Ronda Louderman <rlouderman@AltaMesa.net>; Dale R. Hayes <dhayes@AltaMesa.net>; Werntz, James <Werntz.James@epa.gov>; Kenney, James <Kenney.James@epa.gov>; Bellovary, Chris <Bellovary.Chris@epa.gov>; Steiner-Riley, Cara <Steiner-Riley.Cara@epa.gov>
Subject: RE: Injection Well Application

Hi Richard, My direct mailing address is:

Peter Contreras, Manager
Ground Water Unit
US EPA, Region 10
1200 Sixth Avenue, Mail Stop: OCE-101
Seattle, WA 98101

Thanks,

Peter

Peter Contreras | Ground Water Unit | EPA Region 10 Seattle | 206 553 6708

From: Richard Brown [mailto:richard@weiserbrown.email]
Sent: Tuesday, August 08, 2017 11:20 AM
To: Contreras, Peter <Contreras.Peter@epa.gov>
Cc: Michael Christian <mchristian@mch-lawyer.com>; Ronda Louderman <rlouderman@AltaMesa.net>; Dale R. Hayes <dhayes@AltaMesa.net>; Werntz, James <Werntz.James@epa.gov>; Kenney, James <Kenney.James@epa.gov>; Bellovary, Chris <Bellovary.Chris@epa.gov>; Steiner-Riley, Cara <Steiner-Riley.Cara@epa.gov>
Subject: RE: Injection Well Application

Peter-Our finalized permit application is being reviewed internally and should go out in next 24-48 hours. What is your direct address and is it different if we send the application via FED EX? Thanks-Richard

```
Richard Brown, Weiser-Brown Oil Co.
Snake River Oil and Gas LLC
```

Cell/Office 713-818-6856
RB-WeiserBrown@comcast.net

From: Contreras, Peter [mailto:Contreras.Peter@epa.gov]
Sent: Friday, July 28, 2017 1:07 PM
To: Richard Brown <richard@weiserbrown.email>
Cc: Michael Christian <mchristian@mch-lawyer.com>; Ronda Louderman <rlouderman@AltaMesa.net>; Dale R. Hayes <dhayes@AltaMesa.net>; Werntz, James <Werntz.James@epa.gov>; Kenney, James <Kenney.James@epa.gov>; Bellovary, Chris <Bellovary.Chris@epa.gov>; Steiner-Riley, Cara <Steiner-Riley.Cara@epa.gov>
Subject: RE: Injection Well Application

Richard,

Thank you for your email. I am copying Chris Bellovary, in our Office of Regional Counsel. Chris was the one who communicated previously with Mr. Christian.

If you send any permit application to EPA, you can send it to my attention. I will work with others at EPA and Idaho to coordinate the review, as we are able. EPA is continuing to coordinate with Idaho state staff on how we can support this effort.

Regards,

Peter

Peter Contreras | Ground Water Unit | EPA Region 10 Seattle | 206 553 6708

From: Richard Brown [mailto:richard@weiserbrown.email]
Sent: Friday, July 28, 2017 10:15 AM
To: Contreras, Peter <Contreras.Peter@epa.gov>
Cc: Michael Christian <mchristian@mch-lawyer.com>; Ronda Louderman <rlouderman@AltaMesa.net>; Dale R. Hayes <dhayes@AltaMesa.net>; Werntz, James <Werntz.James@epa.gov>; Kenney, James <Kenney.James@epa.gov>
Subject: Injection Well Application

Peter- Thanks for the time yesterday. Per our conversation and after more thorough review, we are of the position that the ban in Idaho no longer exists and is not an issue. The ban was imposed in 1985 and pertained to all classes of injection wells other than Class V. It was countermanded in 2013 when the state rules were re-written and approved by the legislature. The current rules as re-written in 2013 include all the details of a Class II program and no "ban". As to the aquifer reclassification issue and DEQ, we are reviewing the best and most expeditious remedy and will be meeting with DEQ shortly. As I mentioned, my partners at Alta Mesa will be submitting our injection

well application within 7-10 days. I'm copying our attorney Michael Christian who you met at the Boise meeting. As you mentioned, Michael has had conversation with your attorney in Seattle. I don’t think they have conversed since we researched the re-written rules and their effect on the "ban". I have also copied Mrs. Ronda Louderman with Alta Mesa. Ronda is in charge of regulatory affairs at Alta Mesa and is the one preparing the application. I believe Alta Mesa has filed a recent injection application with the EPA and it was in Florida. I'll let Ronda confirm. I think she is quite knowledgeable in this arena. I'm also copying Dale Hayes. Dale is the head engineer at Alta Mesa and would have engineering oversight over the injection well. Regards-
Richard

Richard Brown, Weiser-Brown Oil Co.
Snake River Oil and Gas LLC
Cell/Office 713-818-6856
RB-WeiserBrown@comcast.net

Analytical Laboratories, Inc.

1804 N. 33rd Street
Boise, Idaho 83703
Phone (208) 342-5515

Attn: JEFF JANIK
ALTA MESA SERVICES, LP
15021 KATY FREEWAY STE 400
HOUSTON, TX 77094

Collected By: J JANIK
Submitted By: J JANIK

Perfs 5380 - 5390'

Source of Sample:
DJS PROP 2-14 PRODUCOD WATER

Time of Collection: 16:00
Date of Collection: 10/22/2014
Date Received: 10/23/2014
Report Date: 11/7/2014

Field Temp:
Temp Rcvd in Lab: 20.4 °C
PWS:
PWS Name

Laboratory Analysis Report

Sample Number: 1442245

NO FIELD TEMP GIVEN; NO TRAVEL BLANKS RCVD; Methane, Ethane, and Ethene testing were performed by Accutest Mountain States (AMS).

Test Requested	MCL	Analysis Result	Units	MDL	Method	Date Completed	Analyst
Aluminum, Al	UR	1.12	mg/L	0.10	EPA 200.7	10/24/2014	KC
Arsenic Low	0.01	< 0.005	mg/L	0.005	EPA 200.8	11/3/2014	JH
Barium, Ba	2	0.12	mg/L	0.05	EPA 200.7	10/24/2014	KC
Boron, B		7.40	mg/L	0.10	EPA 200.7	11/4/2014	KC
Calcium, Ca	UR	51.1	mg/L	0.50	EPA 200.7	10/28/2014	KC
Iron, Fe	UR	11.9	mg/L	0	EPA 200.7	10/29/2014	KC
Magnesium, Mg	UR	0.50	mg/L	0.50	EPA 200.7	10/28/2014	KC
Manganese Low		0.128	mg/L	0.005	EPA 200.7	10/24/2014	KC
Potassium, K	UR	56.7	mg/L	0.5	EPA 200.7	10/28/2014	KC
Selenium Low	0.05	< 0.005	mg/L	0.005	EPA 200.8	11/3/2014	JH
Silica	UR	106	mg/L	0.25	EPA 200.7	11/4/2014	KC
Sodium, Na	UR	392	mg/L	0.50	EPA 200.7	10/28/2014	KC
Uranium, U	30	< 5	ug/L	5	EPA 200.8	11/3/2014	JH
Metals Digestion		*			EPA 200.9-11	10/23/2014	JMS
Density		0.998	g/mL		Gravimetric	11/4/2014	JH
Nitrate (as N)		< 0.2	mg/L	0.2	EPA 300.0	10/23/2014	NC

MCL = Maximum Contamination Level
MDL = Method/Minimum Detection Limit
UR = Unregulated

Laboratory Analysis Report

Sample Number: 1442245

NO FIELD TEMP GIVEN; NO TRAVEL BLANKS RCVD; Methane, Ethane, and Ethene testing were performed by Accutest Mountain States (AMS).

Test Requested	MCL	Analysis Result	Units	MDL	Method	Date Completed	Analyst
Benzene		1510	ug/L	0.5	EPA 8260B	10/28/2014	CY
Toluene		830	ug/L	0.5	EPA 8260B	10/28/2014	CY
Ethylbenzene		55.0	ug/L	0.5	EPA 8260B	10/28/2014	CY
Xylene, Total		390	ug/L	0.5	EPA 8260B	10/28/2014	CY
Methane		2.49	mg/L	0.0008	RSKSOP 175	10/27/2014	AMS
Ethane		0.399	mg/L	0.0016	RSKSOP 175	10/27/2014	AMS
Ethene		<0.0024	mg/L	0.0024	RSKSOP 175	10/27/2014	AMS
Alkalinity	UR	332	mg/L CaCO3		EPA 310.1	10/30/2014	CJS
Chloride, Cl	UR	305	mg/L	1	EPA 300.0	10/23/2014	NC
Fluoride, F	4.0	6.88	mg/L	0.10	EPA 300.0	10/23/2014	NC
Sulfate, SO4	UR	34	mg/L	1	EPA 300.0	10/23/2014	NC
pH	UR	8.8	S.U.		SM 4500-H B	10/23/2014	RME
Conductivity	UR	1,880	umhos	2	SM 2510B	10/23/2014	RME
Bicarbonate		302	mg/L		SM 2320	10/30/2014	CJS
Carbonate		29.8	mg/L		SM 2320	10/30/2014	CJS
Hydroxide		0.0	mg/L		SM 2320	10/30/2014	CJS
Resistivity		5.32	ohm*cm			10/23/2014	DS
Total Dissolved Solids	UR	1,540	mg/L	25	SM 2540C	10/28/2014	GM

MCL = Maximum Contamination Level
MDL = Method/Minimum Detection Limit
UR = Unregulated

Thank you for choosing Analytical Laboratories for your testing needs.
If you have any questions concerning this report,
please contact your client manager: **James Hibbs**

Date Report Printed: 11/7/2014 11:59:12

Analytical Laboratories, Inc.
1804 N. 33rd Street
Boise, Idaho 83703
Phone (208) 342-5515

Date Report Printed: 11/21/2014 3:49:55 PM
http://www.analyticallaboratories.com
These test results relate only to the items tested.

Laboratory Analysis Report

Sample Number: 1442246

Attn: JEFF JANIK
ALTA MESA SERVICES, LP
15021 KATY FREEWAY STE 400
HOUSTON, TX 77094

Collected By: J JANIK
Submitted By: J JANIK

Source of Sample:
DJS PROP 2-14 PRODUCOD WATER

Time of Collection: 16:00
Date of Collection: 10/22/2014
Date Received: 10/23/2014
Report Date: 11/21/2014

PWS#:
PWS Name:

Field Temp: Temp Rcvd in Lab: 20.4 °C

NO FIELD TEMP GIVEN; Radiological testing was performed by Summit Environmental (SUM).

Test Requested	MCL	Analysis Result	Units	MDL	Method	Date Completed	Analyst
Gross Alpha	15 pCi	<3	pCi/L	3	EPA 900.0	11/11/2014	SUM
Gross Beta		57+/-5.8	pCi/L	4	EPA 900.0	11/11/2014	SUM

Thank you for choosing Analytical Laboratories for your testing needs.
If you have any questions about this report, or any future analytical needs, please contact your client manager:
James Hibbs

MCL = Maximum Contamination Level
MDL = Method/Minimum Detection Limit
UR = Unregulated

CLIENT CODE=

CHAIN OF CUSTODY RECORD

ANALYTICAL LABS, INC.
1804 N. 33rd Street • Boise, ID 83703
(208) 342-5515 • Fax: (208) 342-5591 • 1-800-574-5773
Website: www.analyticallaboratories.com
E-mail: ali@analyticallaboratories.com

CLIENT INFORMATION:

Project Manager: JEFF JANIK
Company: ALTA MESA SERVICES
Address: 15021 KATY FRWY, SUITE 400
HOUSTON, TX 77094
Phone: 713.824.9427
Fax:
Sampled by: (Please print) JEFF JANIK

PROJECT INFORMATION:

Project Name: DJS PROP. 2-14
PWS Number:
Purchase Order Number:
Required Due Date:
E-mail Address: JJANIK@ALTAMESA.NET
Transported by: (Please print) JEFF JANIK

TESTS REQUESTED

FOLLOW BOTTLES

Lab ID	Date Sampled	Time Sampled	Sample Description (Source)	Sample Matrix	Remarks:
42245	8/22	4:00	PRODUCED WATER		
	8/22	4:00	"		
	8/22	4:00	"		
	8/22	4:00	"		
	8/22	4:00	"		
	8/22	4:00	"		
42246	8/22	4:00	"		CADS/Alpha/Beta
	10/22		"		
	RB		"		
			"		

Invoice to: (If different than above address)

Special Instructions: * NO field Temp rad / NO Travel Blanks rcd

ALLOCATIONS OF RISK: Analytical Laboratories, Inc. will perform preparation and testing services, obtain findings and prepare reports in accordance with Good Laboratory Practices (GLP). If, for any reason, Analytical Laboratories, Inc. errors in the conduct of a test or procedure, their liability shall be limited to the cost of the test or procedure completed in error. Under no circumstances will Analytical Laboratories, Inc. be liable for any other cost associated with obtaining a sample or use of data.

Note: Samples are discarded 21 days after results are reported. Hazardous samples will be returned to client or disposed of at client expense.

	Print Name:	Company:	Date:	Time:
Relinquished By: (Signature) [signature]	JEFF JANIK	ALTA MESA SERVICES	8/23/14	9:35 AM
Received By: (Signature)				
Relinquished By: (Signature)			10/23/14	
Received By: (Signature) Jordyn Salyers	Jordyn Salyers	ALI	~~8/23/14~~	9:35 a.m

SAMPLE RECEIPT — Total # of Containers: 10 — Chains of Custody Seals Y / N / NA — Intact: Y / N / NA — Temperature Received: 20.4°C — Condition: *

REV. 2/19/12 WHITE: STAYS WITH SAMPLE (S) YELLOW: LAB PINK: SAMPLER

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client:	ALTA MESA INC	**Batch #:**	160525003
Address:	15021 KATY FWY, SUITE 400	**Project Name:**	ALTA MESA TANK
	HOUSTON, TEXAS 77094		
Attn:	WADE MOORE		

Analytical Results Report

Sample Number	160525003-001	**Sampling Date**	5/23/2016	**Date/Time Received**	5/25/2016	12:10 PM
Client Sample ID	ALTA MESA TANK BATTERY			**Sampling Time**		
Matrix	Water	**Sample Location**				
Comments						

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Alkalinity	419	mg CaCO3/L	5	5/26/2016	KMC	SM2320B	
Aluminum	ND	mg/L	0.1	6/1/2016	HSW	EPA 200.7	
Arsenic	ND	mg/L	0.01	5/31/2016	HSW	EPA 200.8	
Barium	0.144	mg/L	0.01	5/31/2016	HSW	EPA 200.8	
Boron	6.93	mg/L	1	6/10/2016	HSW	EPA 200.8	
Cadmium	ND	mg/L	0.01	5/31/2016	HSW	EPA 200.8	
Calcium	16.1	mg/L	1	6/1/2016	HSW	EPA 200.7	
Chloride	143	mg/L	1	5/25/2016 4:25:00 PM	MER	EPA 300.0	
Chromium	ND	mg/L	0.1	6/10/2016	HSW	EPA 200.8	
Conductivity	1700	µmhos/cm	10	5/26/2016	KMC	SM2510B	
Copper	ND	mg/L	0.01	5/31/2016	HSW	EPA 200.8	
Cyanide (free)	0.0197	mg/L	0.01	6/6/2016	MER	SM4500CNE	
Fluoride	7.77	mg/L	1	5/25/2016 4:25:00 PM	MER	EPA 300.0	
Gross Alpha	0.013 +/- 1.62	pCi/L	2.43	6/13/2016	JWC	EPA 900.0	
Gross Beta	20.4 +/- 4.00	pCi/L	3.05	6/13/2016	JWC	EPA 900.0	
Iron	2.33	mg/L	0.2	6/1/2016	HSW	EPA 200.7	
Lead	ND	mg/L	0.01	5/31/2016	HSW	EPA 200.8	
Magnesium	ND	mg/L	1	6/1/2016	HSW	EPA 200.7	
Manganese	ND	mg/L	0.1	6/1/2016	HSW	EPA 200.7	
Mercury-CVAFS	0.476	ug/L	0.01	5/31/2016	ETL	EPA 245.7	
NO3/N	ND	mg/L	1	5/25/2016 4:25:00 PM	MER	EPA 300.0	
NO2/N	ND	mg/L	1	5/25/2016 4:25:00 PM	MER	EPA 300.0	
Potassium	40.8	mg/L	1	6/1/2016	HSW	EPA 200.7	
Radium 226	0.05 +/- 0.10	pCi/L	0.12	6/9/2016	JMI	EPA 903.0	
Radium 228	-0.136 +/- 0.555	pCi/L	0.260	6/10/2016	JMI	EPA 904.0	
Selenium	ND	mg/L	0.01	5/31/2016	HSW	EPA 200.8	
Methanol	667	mg/L	25	6/1/2016	TGT	GC/FID	
Silica (as SiO2)	77.5	mg/L	1	6/1/2016	HSW	EPA 200.7	
Silicon	36.2	mg/L	1	6/1/2016	HSW	EPA 200.7	
Silver	ND	mg/L	0.01	5/31/2016	HSW	EPA 200.8	
Sodium	314	mg/L	1	6/1/2016	HSW	EPA 200.7	
TDS	1420	mg/L	50	5/25/2016	KMC	SM 2540C	
TSS	15.7	mg/L	1	5/26/2016	KMC	SM 2540D	
Strontium	0.508	mg/L	0.1	5/31/2016	HSW	EPA 200.8	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013;NV:ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

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504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client:	ALTA MESA INC	**Batch #:**	160525003
Address:	15021 KATY FWY, SUITE 400 HOUSTON, TEXAS 77094	**Project Name:**	ALTA MESA TANK
Attn:	WADE MOORE		

Analytical Results Report

Sample Number	160525003-001	**Sampling Date**	5/23/2016	**Date/Time Received**	5/25/2016 12:10 PM
Client Sample ID	ALTA MESA TANK BATTERY			**Sampling Time**	
Matrix	Water	**Sample Location**			
Comments					

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Sulfate	9.58	mg/L	1	5/25/2016 4:25:00 PM	MER	EPA 300.0	
MBAS	0.166	mg/L 342.4MW LAS	0.1	6/2/2016	KMC	SM5540C	
Thallium	ND	mg/L	0.01	5/31/2016	HSW	EPA 200.8	
Turbidity	48.5	NTU	0.1	5/26/2016	KMC	EPA 180.1	
Uranium	ND	mg/L	0.01	5/31/2016	HSW	EPA 200.8	
Uranium Activity	ND	pCi/L	6.7	5/31/2016	HSW	EPA 200.8	

Authorized Signature

John Coddington, Lab Manager

MCL EPA's Maximum Contaminant Level
ND Not Detected
PQL Practical Quantitation Limit

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013;NV:ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

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504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client:	ALTA MESA INC	**Batch #:**	160525003
Address:	15021 KATY FWY, SUITE 400 HOUSTON, TEXAS 77094	**Project Name:**	ALTA MESA TANK
Attn:	WADE MOORE		

Analytical Results Report

Sample Number	160525003-001	**Sampling Date**	5/23/2016	**Date/Time Received**	5/25/2016	12:10 PM
Client Sample ID	ALTA MESA TANK BATTERY	**Sampling Time**		**Extraction Date**	5/26/2016	
Matrix	Water	**Sample Location**				
Comments						

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Diesel	32.3	mg/L	0.1	5/31/2016	TGT	EPA 8015D	
Lube Oil	7.48	mg/L	0.5	5/31/2016	TGT	EPA 8015D	
Gasoline	38.4	mg/L	0.1	6/1/2016	SAT	EPA 8015D	

Surrogate Data

Sample Number 160525003-001

Surrogate Standard	Method	Percent Recovery	Control Limits
4-Bromofluorobenzene	EPA 8015D	111.2	50-150
Hexacosane	EPA 8015D	84.2	50-150

Authorized Signature

John Coddington, Lab Manager

MCL EPA's Maximum Contaminant Level
ND Not Detected
PQL Practical Quantitation Limit

This report shall not be reproduced except in full, without the written approval of the laboratory.
The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

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504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client:	ALTA MESA INC	**Batch #:**	160525003
Address:	15021 KATY FWY, SUITE 400 HOUSTON, TEXAS 77094	**Project Name:**	ALTA MESA TANK
Attn:	WADE MOORE		

Analytical Results Report

Sample Number	160525003-001	**Sampling Date**	5/23/2016	**Date/Time Received**	5/25/2016	12:10 PM
Client Sample ID	ALTA MESA TANK BATTERY	**Sampling Time**				
Matrix	Water	**Sample Location**				
Comments						

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
1,1,1,2-Tetrachloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,1,1-Trichloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,1,2,2-Tetrachloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,1,2-Trichloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,1-Dichloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,1-Dichloroethene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,1-dichloropropene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2,3-Trichlorobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2,3-Trichloropropane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2,4-Trichlorobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2,4-Trimethylbenzene	257	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2-Dibromo-3-chloropropane(DBCP)	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2-Dibromoethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2-Dichlorobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2-Dichloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2-Dichloropropane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,3,5-Trimethylbenzene	127	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,3-Dichlorobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,3-Dichloropropane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,4-Dichlorobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
2,2-Dichloropropane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
2-Chlorotoluene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
2-hexanone	ND	ug/L	2.5	6/1/2016	SAT	EPA 8260C	
4-Chlorotoluene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Acetone	13500	ug/L	2.5	6/1/2016	SAT	EPA 8260C	
Acrylonitrile	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Benzene	24800	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Bromobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	

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Client: ALTA MESA INC
Address: 15021 KATY FWY, SUITE 400
HOUSTON, TEXAS 77094
Attn: WADE MOORE

Batch #: 160525003
Project Name: ALTA MESA TANK

Analytical Results Report

Sample Number 160525003-001
Client Sample ID ALTA MESA TANK BATTERY
Matrix Water
Comments

Sampling Date 5/23/2016
Sampling Time
Sample Location

Date/Time Received 5/25/2016 12:10 PM

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Bromochloromethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Bromodichloromethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Bromoform	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Bromomethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Carbon disulfide	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Carbon Tetrachloride	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Chlorobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Chloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Chloroform	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Chloromethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
cis-1,2-dichloroethene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
cis-1,3-Dichloropropene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Dibromochloromethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Dibromomethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Dichlorodifluoromethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Ethylbenzene	1080	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Hexachlorobutadiene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Isopropylbenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
m+p-Xylene	4170	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Methyl ethyl ketone (MEK)	ND	ug/L	2.5	6/1/2016	SAT	EPA 8260C	
Methyl isobutyl ketone (MIBK)	ND	ug/L	2.5	6/1/2016	SAT	EPA 8260C	
Methylene chloride	ND	ug/L	2.5	6/1/2016	SAT	EPA 8260C	
methyl-t-butyl ether (MTBE)	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Naphthalene	59.2	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
n-Butylbenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
n-Propylbenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
o-Xylene	1150	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
p-isopropyltoluene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
sec-Butylbenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	

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Client: ALTA MESA INC
Address: 15021 KATY FWY, SUITE 400
HOUSTON, TEXAS 77094
Attn: WADE MOORE

Batch #: 160525003
Project Name: ALTA MESA TANK

Analytical Results Report

Sample Number 160525003-001
Client Sample ID ALTA MESA TANK BATTERY
Matrix Water
Comments

Sampling Date 5/23/2016
Sampling Time
Sample Location

Date/Time Received 5/25/2016 12:10 PM

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Styrene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
tert-Butylbenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Tetrachloroethene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Toluene	17800	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
trans-1,2-Dichloroethene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
trans-1,3-Dichloropropene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Trichloroethene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Trichloroflouromethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Vinyl Chloride	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	

Surrogate Data

Sample Number 160525003-001

Surrogate Standard	Method	Percent Recovery	Control Limits
1,2-Dichlorobenzene-d4	EPA 8260C	101.6	70-130
4-Bromofluorobenzene	EPA 8260C	99.6	70-130
Toluene-d8	EPA 8260C	99.6	70-130

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013;NV:ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

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Client: ALTA MESA INC
Address: 15021 KATY FWY, SUITE 400
HOUSTON, TEXAS 77094
Attn: WADE MOORE

Batch #: 160525003
Project Name: ALTA MESA TANK

Analytical Results Report

Sample Number 160525003-002
Client Sample ID TRIP BLANK
Matrix Water
Comments

Sampling Date 5/23/2016
Sampling Time
Sample Location

Date/Time Received 5/25/2016 12:10 PM

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
1,1,1,2-Tetrachloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,1,1-Trichloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,1,2,2-Tetrachloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,1,2-Trichloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,1-Dichloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,1-Dichloroethene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,1-dichloropropene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2,3-Trichlorobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2,3-Trichloropropane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2,4-Trichlorobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2,4-Trimethylbenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2-Dibromo-3-chloropropane(DBCP)	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2-Dibromoethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2-Dichlorobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2-Dichloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2-Dichloropropane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,3,5-Trimethylbenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,3-Dichlorobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,3-Dichloropropane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,4-Dichlorobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
2,2-Dichloropropane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
2-Chlorotoluene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
2-hexanone	ND	ug/L	2.5	6/1/2016	SAT	EPA 8260C	
4-Chlorotoluene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Acetone	ND	ug/L	2.5	6/1/2016	SAT	EPA 8260C	
Acrylonitrile	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Benzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Bromobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Bromochloromethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	

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Client:	ALTA MESA INC	**Batch #:**	160525003
Address:	15021 KATY FWY, SUITE 400 HOUSTON, TEXAS 77094	**Project Name:**	ALTA MESA TANK
Attn:	WADE MOORE		

Analytical Results Report

Sample Number	160525003-002	**Sampling Date**	5/23/2016	**Date/Time Received**	5/25/2016	12:10 PM
Client Sample ID	TRIP BLANK	**Sampling Time**				
Matrix	Water	**Sample Location**				
Comments						

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Bromodichloromethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Bromoform	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Bromomethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Carbon disulfide	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Carbon Tetrachloride	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Chlorobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Chloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Chloroform	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Chloromethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
cis-1,2-dichloroethene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
cis-1,3-Dichloropropene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Dibromochloromethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Dibromomethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Dichlorodifluoromethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Ethylbenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Hexachlorobutadiene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Isopropylbenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
m+p-Xylene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Methyl ethyl ketone (MEK)	ND	ug/L	2.5	6/1/2016	SAT	EPA 8260C	
Methyl isobutyl ketone (MIBK)	ND	ug/L	2.5	6/1/2016	SAT	EPA 8260C	
Methylene chloride	ND	ug/L	2.5	6/1/2016	SAT	EPA 8260C	
methyl-t-butyl ether (MTBE)	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Naphthalene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
n-Butylbenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
n-Propylbenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
o-Xylene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
p-isopropyltoluene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
sec-Butylbenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Styrene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	

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Client:	ALTA MESA INC	**Batch #:**	160525003
Address:	15021 KATY FWY, SUITE 400 HOUSTON, TEXAS 77094	**Project Name:**	ALTA MESA TANK
Attn:	WADE MOORE		

Analytical Results Report

Sample Number	160525003-002	**Sampling Date**	5/23/2016	**Date/Time Received**	5/25/2016 12:10 PM
Client Sample ID	TRIP BLANK	**Sampling Time**			
Matrix	Water	**Sample Location**			
Comments					

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
tert-Butylbenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Tetrachloroethene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Toluene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
trans-1,2-Dichloroethene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
trans-1,3-Dichloropropene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Trichloroethene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Trichloroflouromethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Vinyl Chloride	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	

Surrogate Data

Sample Number 160525003-002

Surrogate Standard	Method	Percent Recovery	Control Limits
1,2-Dichlorobenzene-d4	EPA 8260C	102.0	70-130
4-Bromofluorobenzene	EPA 8260C	99.2	70-130
Toluene-d8	EPA 8260C	100.8	70-130

Authorized Signature John W. Codd

John Coddington, Lab Manager

MCL EPA's Maximum Contaminant Level
ND Not Detected
PQL Practical Quantitation Limit

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013;NV:ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

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Client:	ALTA MESA INC	**Batch #:**	160525003
Address:	15021 KATY FWY, SUITE 400	**Project Name:**	ALTA MESA TANK
	HOUSTON, TEXAS 77094		
Attn:	WADE MOORE		

Analytical Results Report

Sample Number	160525003-001	**Sampling Date**	5/23/2016	**Date/Time Received**	5/25/2016 12:10 PM
Client Sample ID	ALTA MESA TANK BATTERY	**Sampling Time**		**Extraction Date**	5/30/2016
Matrix	Water	**Sample Location**			
Comments					

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
1,2,4-Trichlorobenzene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
1,2-Dichlorobenzene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
1,2-Diphenyl hydrazine	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
1,3-Dichlorobenzene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
1,4-Dichlorobenzene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
1-Methylnaphthalene	116	ug/L	10	6/7/2016	HSW	EPA 8270D	
2,3,4,6-Tetrachlorophenol	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
2,3,5,6-Tetrachlorophenol	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
2,4,5-Trichlorophenol	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
2,4,6-Trichlorophenol	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
2,4-Dichlorophenol	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
2,4-Dimethylphenol	571	ug/L	100	6/7/2016	HSW	EPA 8270D	
2,4-Dinitrophenol	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
2,4-Dinitrotoluene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
2,6-Dinitrotoluene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
2-Chloronaphthalene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
2-Chlorophenol	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
2-Methylnaphthalene	245	ug/L	10	6/7/2016	HSW	EPA 8270D	
2-Methylphenol	1330	ug/L	100	6/7/2016	HSW	EPA 8270D	
2-Nitroaniline	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
2-Nitrophenol	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
3,3'-Dichlorobenzidine	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
3+4-Methylphenol	1880	ug/L	100	6/7/2016	HSW	EPA 8270D	
3-Nitroaniline	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
4,6-Dinitro-2-methylphenol	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
4-Bromophenyl-phenylether	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
4-Chloro-3-methylphenol	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
4-Chloroaniline	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
4-Chlorophenyl-phenylether	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
4-Nitroaniline	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
4-Nitrophenol	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Acenaphthene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Acenaphthylene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Aniline	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	

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Client:	ALTA MESA INC	**Batch #:**	160525003
Address:	15021 KATY FWY, SUITE 400	**Project Name:**	ALTA MESA TANK
	HOUSTON, TEXAS 77094		
Attn:	WADE MOORE		

Analytical Results Report

Sample Number	160525003-001	**Sampling Date**	5/23/2016	**Date/Time Received**	5/25/2016 12:10 PM
Client Sample ID	ALTA MESA TANK BATTERY	**Sampling Time**		**Extraction Date**	5/30/2016
Matrix	Water	**Sample Location**			
Comments					

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Anthracene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Benzidine	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Benzo(ghi)perylene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Benzo[a]anthracene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Benzo[a]pyrene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Benzo[b]fluoranthene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Benzo[k]fluoranthene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Benzyl alcohol	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
bis(2-Chloroethoxy)methane	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
bis(2-Chloroethyl)ether	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
bis(2-chloroisopropyl)ether	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
bis(2-Ethylhexyl)phthalate	22.3	ug/L	10	6/7/2016	HSW	EPA 8270D	
Butylbenzylphthalate	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Carbazole	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Chrysene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Dibenz[a,h]anthracene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Dibenzofuran	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Diethylphthalate	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Dimethylphthalate	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Di-n-butylphthalate	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Di-n-octylphthalate	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Fluoranthene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Fluorene	16.7	ug/L	10	6/7/2016	HSW	EPA 8270D	
Hexachlorobenzene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Hexachlorobutadiene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Hexachlorocyclopentadiene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Hexachloroethane	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Indeno[1,2,3-cd]pyrene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Isophorone	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Naphthalene	265	ug/L	10	6/7/2016	HSW	EPA 8270D	
Nitrobenzene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Nitrosodimethylamine	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
n-Nitroso-di-n-propylamine	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
n-Nitrosodiphenylamine	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Pentachlorophenol	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: ALTA MESA INC
Address: 15021 KATY FWY, SUITE 400
HOUSTON, TEXAS 77094
Attn: WADE MOORE

Batch #: 160525003
Project Name: ALTA MESA TANK

Analytical Results Report

Sample Number	160525003-001	**Sampling Date**	5/23/2016	**Date/Time Received**	5/25/2016	12:10 PM
Client Sample ID	ALTA MESA TANK BATTERY	**Sampling Time**		**Extraction Date**	5/30/2016	
Matrix	Water	**Sample Location**				
Comments						

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Phenanthrene	48.5	ug/L	10	6/7/2016	HSW	EPA 8270D	
Phenol	3270	ug/L	100	6/7/2016	HSW	EPA 8270D	
Pyrene	21.3	ug/L	10	6/7/2016	HSW	EPA 8270D	
Pyridine	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	

Surrogate Data

Sample Number 160525003-001

Surrogate Standard	Method	Percent Recovery	Control Limits
2,4,6-Tribromophenol	EPA 8270D	104.2	43-120
2-Fluorobiphenyl	EPA 8270D	87.2	58-122
2-Fluorophenol	EPA 8270D	93.4	45-119
Nitrobenzene-d5	EPA 8270D	89.6	58-120
Phenol-d5	EPA 8270D	103.2	52-115
Terphenyl-d14	EPA 8270D	96.0	22-133

Authorized Signature

John Coddington, Lab Manager

MCL EPA's Maximum Contaminant Level
ND Not Detected
PQL Practical Quantitation Limit

This report shall not be reproduced except in full, without the written approval of the laboratory.
The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013;NV:ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

Anatek Labs, Inc.

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504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Login Report

Customer Name: ALTA MESA INC
15021 KATY FWY, SUITE 400
HOUSTON TEXAS 77094

Order ID: 160525003
Order Date: 5/25/2016

Contact Name: WADE MOORE
Project Name: ALTA MESA TANK

Comment:

Sample #: 160525003-001 **Customer Sample #:** ALTA MESA TANK BATTERY

Recv'd: ☑ **Matrix:** Water **Collector:** JEREMY DAVIS **Date Collected:** 5/23/2016

Quantity: 17 **Date Received:** 5/25/2016 12:10:00 PM **Time Collected:**

Comment:

Test	Lab	Method	Due Date	Priority
ALKALINITY	M	SM2320B	5/25/2016	***Normal (~10 Days)***
ALUMINUM ICP	M	EPA 200.7	6/6/2016	***Normal (~10 Days)***
ARSENIC	M	EPA 200.8	6/6/2016	***Normal (~10 Days)***
BARIUM	M	EPA 200.8	6/6/2016	***Normal (~10 Days)***
BORON	M	EPA 200.8	6/6/2016	***Normal (~10 Days)***
BTEX 8260 MOSC	M	EPA 8260C	6/6/2016	***Normal (~10 Days)***
CADMIUM	M	EPA 200.8	6/6/2016	***Normal (~10 Days)***
CALCIUM ICP	M	EPA 200.7	6/6/2016	***Normal (~10 Days)***
CHLORIDE	M	EPA 300.0	6/6/2016	***Normal (~10 Days)***
CHROMIUM	M	EPA 200.8	6/6/2016	***Normal (~10 Days)***
CONDUCTIVITY	M	SM2510B	5/30/2016	***Normal (~10 Days)***
COPPER	M	EPA 200.8	6/6/2016	***Normal (~10 Days)***
CYANIDE FREE SM 4500 CN-E	M	SM4500CNE	6/6/2016	***Normal (~10 Days)***
FLUORIDE	M	EPA 300.0	6/6/2016	***Normal (~10 Days)***
GROSS ALPHA MOSC	M	EPA 900.0	6/6/2016	***Normal (~10 Days)***
GROSS BETA MOSC	M	EPA 900.0	6/6/2016	***Normal (~10 Days)***
IRON ICP	M	EPA 200.7	6/6/2016	***Normal (~10 Days)***
LEAD	M	EPA 200.8	6/6/2016	***Normal (~10 Days)***
MAGNESIUM ICP	M	EPA 200.7	6/6/2016	***Normal (~10 Days)***
MANGANESE ICP	M	EPA 200.7	6/6/2016	***Normal (~10 Days)***
MERCURY-CVAFS	M	EPA 245.7	6/6/2016	***Normal (~10 Days)***
NITRATE/N	M	EPA 300.0	5/25/2016	***Normal (~10 Days)***
NITRITE/N	M	EPA 300.0	5/25/2016	***Normal (~10 Days)***

Customer Name: ALTA MESA INC **Order ID:** 160525003

15021 KATY FWY, SUITE 400 **Order Date:** 5/25/2016

HOUSTON TEXAS 77094

Contact Name: WADE MOORE **Project Name:** ALTA MESA TANK

Comment:

POTASSIUM ICP	M	EPA 200.7	6/6/2016	***Normal (~10 Days)***
RADIUM 226 MOSC	M	EPA 903.0	6/6/2016	***Normal (~10 Days)***
RADIUM 228 MOSC	M	EPA 904.0	6/6/2016	***Normal (~10 Days)***
SELENIUM	M	EPA 200.8	6/6/2016	***Normal (~10 Days)***
SEMIVOLATILES MISC GC/FID	M	GC/FID	5/23/2016	***Normal (~10 Days)***
SILICON ICP	M	EPA 200.7	6/6/2016	***Normal (~10 Days)***
SILVER	M	EPA 200.8	6/6/2016	***Normal (~10 Days)***
SODIUM ICP	M	EPA 200.7	6/6/2016	***Normal (~10 Days)***
SOLIDS - TDS	M	SM 2540C	5/30/2016	***Normal (~10 Days)***
SOLIDS - TSS	M	SM 2540D	5/30/2016	***Normal (~10 Days)***
STRONTIUM	M	EPA 200.8	6/6/2016	***Normal (~10 Days)***
SULFATE	M	EPA 300.0	6/6/2016	***Normal (~10 Days)***
SURFACTANTS	M	SM5540C	5/25/2016	***Normal (~10 Days)***
SVOC 8270D MOSC	M	EPA 8270D	5/30/2016	***Normal (~10 Days)***
THALLIUM	M	EPA 200.8	6/6/2016	***Normal (~10 Days)***
TPHDX MOSC	M	EPA 8015D	6/1/2016	***Normal (~10 Days)***
TPHG MOSC	M	EPA 8015D	6/1/2016	***Normal (~10 Days)***
TURBIDITY	M	EPA 180.1	5/25/2016	***Normal (~10 Days)***
URANIUM	M	EPA 200.8	6/6/2016	***Normal (~10 Days)***
VOC 8260 MOSC	M	EPA 8260C	6/6/2016	***Normal (~10 Days)***

Sample #: 160525003-002 **Customer Sample #:** TRIP BLANK

Recv'd: ☑ **Matrix:** Water **Collector:** **Date Collected:** 5/23/2016

Quantity: 1 **Date Received:** 5/25/2016 12:10:00 PM **Time Collected:**

Comment:

Test	Lab	Method	Due Date	Priority
VOC 8260 MOSC	M	EPA 8260C	6/6/2016	***Normal (~10 Days)***

Customer Name:	ALTA MESA INC	**Order ID:**	160525003
	15021 KATY FWY, SUITE 400	**Order Date:**	5/25/2016
	HOUSTON TEXAS 77094		
Contact Name:	WADE MOORE	**Project Name:**	ALTA MESA TANK
Comment:			

SAMPLE CONDITION RECORD

Samples received in a cooler?	Yes
Samples received intact?	Yes
What is the temperature of the sample(s)? (°C)	5.7
Samples received with a COC?	Yes
Samples received within holding time?	Yes
Are all sample bottles properly preserved?	Yes
Are VOC samples free of headspace?	Yes
Is there a trip blank to accompany VOC samples?	Yes
Labels and chain agree?	Yes

160525 003 **ALTM** Last Due 6/6/2016
1st SAMP 5/23/2016 1st RCVD 5/25/2016
ALTA MESA TANK

Anatek Labs, Inc.

Chain of Custody Record

1282 Alturas Drive, Moscow ID 83843 (208) 883-2839 FAX 882-9246
504 E Sprague Ste D, Spokane WA 99202 (509) 838-3999 FAX 838-4433

Company Name: Alta Mesa Holdings
Address: 4649 Little Willow Rd
City: Payette State: ID Zip: 83661
Phone: 832-248-9390
Fax: N/A

Project Manager: Wade Moore
Project Name & #:
Email Address: wmoore@altamesa.net
Purchase Order #:
Sampler Name & phone:

Turn Around Time & Reporting

Please refer to our normal turn around times at: http://www.anateklabs.com/services/guidelines/reporting.asp

__Normal
__Next Day*
__2nd Day*
__Other* _____

*All rush order requests must be prior approved.

__Phone
__Mail
__Fax
__Email

Provide Sample Description / **List Analyses Requested** / **Note Special Instructions/Comments**

Lab ID	Sample Identification	Sampling Date/Time	Matrix	# of Containers	Sample Volume	VOC	TPH-Gx	Mercury	Metals	Cyanide	Methonal	Rad 228/226	Alpha Beta	Inorganics	SVOC
Preservative:						ı	ı	ı	ı	ı	ı	ı	ı		ı
-01	Alta Mesa Tank	5/23/16	H2O	3	40ml	X									
	Alta Mesa Tank	5/23/16	H2O	2	40ml		X								
	Alta Mesa Tank	5/23/16	H2O	2	40ml			X							
	Alta Mesa Tank	5/23/16	H2O	1	250ml				X						
	Alta Mesa "	5/23/16	H2O	1	250ml					X					
	Alta Mesa "	5/23/16	H2O	1	250ml						X				
	Alta Mesa	5/23/16	H2O	2	1L							X			
	Alta Mesa	5/23/16	H2O	1	1L								X		
	Alta Mesa	5/23/16	H2O	1	1L									X	
	Alta Mesa	5/23/16	H2O	1	1L										X
	Alta Mesa	5/23/16	H2O	1	1L	TPH-DX			-						
	Alta Mesa	5/23/16	H2O	1	1L	PAH									
-02	Trip Blank														

1 trip blank
18 containers
MWBS

	Printed Name	Signature	Company	Date	Time
Relinquished by					
Received by	Nell Lokteff	Nell Lokteff	Anatek	05/24	12:10
Relinquished by					
Received by					
Relinquished by					
Received by					

Inspection Checklist

Received Intact? (Y) N
Labels & Chains Agree? Y N
Containers Sealed? (Y) N
VOC Head Space? Y N
FedEx
Temperature (°C): 5.7 IR-1
Preservative: NAOH (14-1), HCL, HCL (1621)
Date & Time: 05/24/16 12:10
Inspected By: NL

18 containers

OMB No. 2040-0042 Approval Expires 12/31/2018

EPA

United States Environmental Protection Agency
Washington, DC 20460

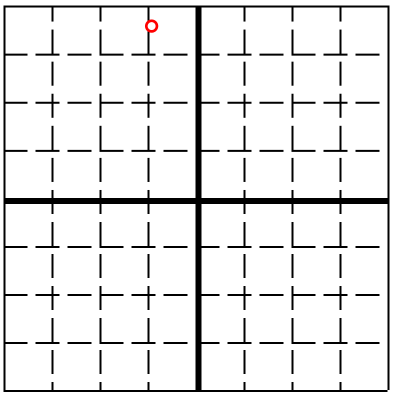
PLUGGING AND ABANDONMENT PLAN

Name and Address of Facility	Name and Address of Owner/Operator
DJS Properties # 2-14	Alta Mesa Services, LP, 15021 Katy Fwy, St 400, Houston, TX 77094

Locate Well and Outline Unit on Section Plat - 640 Acres

N

W



E

S

State	County	Permit Number
Idaho	Payette	LU600120

Surface Location Description

NE 1/4 of NE 1/4 of NE 1/4 of N 1/4 of Section 14 Township 8N Range 4W

Locate well in two directions from nearest lines of quarter section and drilling unit

Surface
Location 95 ft. frm (N/S) N Line of quarter section
and 2315 ft. from (E/W) W Line of quarter section.

TYPE OF AUTHORIZATION	WELL ACTIVITY
☑ Individual Permit	☐ CLASS I
☐ Area Permit	☑ CLASS II
☐ Rule	☑ Brine Disposal
Number of Wells 1	☐ Enhanced Recovery
	☐ Hydrocarbon Storage
	☐ CLASS III
Lease Name DJS Properties	Well Number 2-14

CASING AND TUBING RECORD AFTER PLUGGING

SIZE	WT (LB/FT)	TO BE PUT IN WELL (FT)	TO BE LEFT IN WELL (FT)	HOLE SIZE
7"	26	5500	5500	8.75"
9.625"	40	1082	1082	12.75
13.375"	61	120	120	17.5"

METHOD OF EMPLACEMENT OF CEMENT PLUGS

- ☑ The Balance Method
- ☐ The Dump Bailer Method
- ☐ The Two-Plug Method
- ☑ Other

CEMENTING TO PLUG AND ABANDON DATA:	PLUG #1	PLUG #2	PLUG #3	PLUG #4	PLUG #5	PLUG #6	PLUG #7
Size of Hole or Pipe in which Plug Will Be Placed (inche	7"	7"					
Depth to Bottom of Tubing or Drill Pipe (ft	5410	750					
Sacks of Cement To Be Used (each plug)	TBD	TBD					
Slurry Volume To Be Pumped (cu. ft.)	282	162					
Calculated Top of Plug (ft.)	4100	0					
Measured Top of Plug (if tagged ft.)	N/A - future	N/A - future					
Slurry Wt. (Lb./Gal.)	TBD	TBD					
Type Cement or Other Material (Class III)	TBD	TBD					

LIST ALL OPEN HOLE AND/OR PERFORATED INTERVALS AND INTERVALS WHERE CASING WILL BE VARIED (if any)

From	To	From	To
4306	4330 (existing perfs)	5380	5390 (existing perfs)
4354	4374 (existing perfs)	5390	5410 (to be added for injection)
5045	5050 (existing perfs)		
5335	5360 (existing perfs)		

Estimated Cost to Plug Wells

TBD - cement type, volumes, density and type to be determined based on regulatory requirements and products in existence at time of plugging.

Certification

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibliity of fine and imprisonment. (Ref. 40 CFR 144.32)

Name and Official Title *(Please type or print)*	Signature	Date Signed

Paperwork Reduction Act Notice

The public reporting and record keeping burden for this collection of information is estimated to average 4.5 hours for operators of Class I hazardous wells, 1.5 hours for operators of Class I non-hazardous wells, 3 hours for operators of Class II wells, and 1.5 hours for operators of Class III wells.
Burden means the total time, effort, or financial resources expended by persons to generate, maintain, retain, or disclose or provide information to or for a Federal agency. This includes the time needed to review instructions; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to be able to respond to the collection of information; search data sources; complete and review the collection of information; and, transmit or otherwise disclose the information. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. The OMB control numbers for EPA's regulations are listed in 40 CFR Part 9 and 48 CFR Chapter 15.
Please send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including the use of automated collection techniques to Director, Office of Environmental Information, Collection Strategies Division, U.S. Environmental Protection Agency (2822), Ariel Rios Building, 1200 Pennsylvania Ave., NW., Washington, DC 20460; and to the Office of Information and Regulatory Affairs, Office of Management and Budget, 725 17th Street, NW., Washington, DC 20503, Attention: Desk Officer for EPA. Please include the EPA ICR number and OMB control number in any correspondence.

OMB No. 2040-0042 Approval Expires 12/31/2018

EPA

United States Environmental Protection Agency

Underground Injection Control Permit Application

(Collected under the authority of the Safe Drinking Water Act. Sections 1421, 1422, 40 CFR 144)

I. EPA ID Number		T/A	C
U	OCT 16 2017		

Read Attached Instructions Before Starting

For Official Use Only

Application approved (mo day year)	Date received (mo day year)	Permit Number	Well ID	FINDS Number

II. Owner Name and Address			III. Operator Name and Address		
Owner Name: Alta Mesa Services, LP			Owner Name: Alta Mesa Services, LP		
Street Address: 15021 Katy Freewway, Suite 400		Phone Number: (281) 530-0991	Street Address: 15021 Katy Freeway, Suite 400		Phone Number: (281) 530-0991
City: Houston	State: TX	ZIP CODE: 77094	City: Houston	State: TX	ZIP CODE: 77094

IV. Commercial Facility	V. Ownership	VI. Legal Contact	VII. SIC Codes
[x] Yes [ ] No	[x] Private [ ] Federal [ ] Other	[x] Owner [ ] Operator	NAICS=211111 SIC = 1311

VIII. Well Status *(Mark "x")*

[ ] A Operating	Date Started (mo day year)	[x] B. Modification/Conversion	[x] C. Proposed

IX. Type of Permit Requested *(Mark "x" and specify if required)*

[x] A. Individual	[ ] B. Area	Number of Existing Wells	Number of Proposed Wells	Name(s) of field(s) or project(s)
		1 (One)	1 (One)	DJS Properties 2-14

X. Class and Type of Well *(see reverse)*

A. Class(es) (enter code(s))	B. Type(s) (enter code(s))	C. If class is "other" or type is code 'x,' explain	D. Number of wells per type (if area permit)
Class II	Type D	N/A	1 (One)

XI. Location of Well(s) or Approximate Center of Field or Project

Latitude Deg	Latitude Min	Latitude Sec	Longitude Deg	Longitude Min	Longitude Sec	Township and Range Sec	Twp	Range	1/4 Sec	Feet From	Line	Feet From	Line
44	02	19.2	116	46	60	14	8N	4W	NW	95	NL	2315	WL

XII. Indian Lands (Mark 'x')

[ ] Yes
[x] No

XIII. Attachments

(Complete the following questions on a separate sheet(s) and number accordingly; see instructions)

For Classes I, II, III, (and other classes) complete and submit on a separate sheet(s) Attachments A--U (pp 2-6) as appropriate. Attach maps where required. List attachments by letter which are applicable and are included with your application.

XIV. Certification

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possiblity of fine and imprisonment. (Ref. 40 CFR 144.32)

A. Name and Title *(Type or Print)*	B. Phone No. *(Area Code and No.)*
Dale R. Hayes, VP Frontier Operations	(281) 943-1347
C. Signature D.R. Hayes	**D. Date Signed** 08/07/2017

EPA Form 7520-6 (Rev. 12-11)

Well Class and Type Codes

Class I		Wells used to inject waste below the deepest underground source of drinking water.
Type	**"I"**	Nonhazardous industrial disposal well
	"M"	Nonhazardous municipal disposal well
	"W"	Hazardous waste disposal well injecting below USDWs
	"X"	Other Class I wells (not included in Type "I," "M," or "W")
Class II		Oil and gas production and storage related injection wells.
Type	**"D"**	Produced fluid disposal well
	"R"	Enhanced recovery well
	"H"	Hydrocarbon storage well (excluding natural gas)
	"X"	Other Class II wells (not included in Type "D," "R," or "H")
Class III		Special process injection wells.
Type	**"G"**	Solution mining well
	"S"	Sulfur mining well by Frasch process
	"U"	Uranium mining well (excluding solution mining of conventional mines)
	"X"	Other Class III wells (not included in Type "G," "S," or "U")

Other Classes Wells not included in classes above.
Class V wells which may be permitted under §144.12.
Wells not currently classified as Class I, II, III, or V.

Attachments to Permit Application

Class	**Attachments**
I new well	A, B, C, D, F, H – S, U
existing	A, B, C, D, F, H – U
II new well	A, B, C, E, G, H, M, Q, R; optional – I, J, K, O, P, U
existing	A, E, G, H, M, Q, R, – U; optional – J, K, O, P, Q
III new well	A, B, C, D, F, H, I, J, K, M – S, U
existing	A, B, C, D, F, H, J, K, M – U
Other Classes	To be specified by the permitting authority

INSTRUCTIONS - Underground Injection Control (UIC) Permit Application

Paperwork Reduction Act: The public reporting and record keeping burden for this collection of information is estimatedto average 224 hours for a Class I hazardous well application, 110 hours for a Class I non-hazardous well application,67 hours for a Class II well application, and 132 hours for a Class III well application. Burden means the total time, effort, or financial resource expended by persons to generate, maintain, retain, or disclose or provide information to or for a Federal Agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting,validating, and verifying information, processing and maintaining information, and disclosing andproviding information; adjust the existing ways to comply with any previously applicable instructions and requirements;train personnel to be able to respond to the collection of information; search data sources; complete and review the collection of information; and, transmit or otherwise disclosethe information. An agency may not conduct or sponsor, and a person is not required to respond to, a collectionofinformation unless it displays a currently valid OMB control number. Send comments on the Agency's need for this information, the accuracyof the provided burden estimates, and any suggested methods for minimizing respondentburden, including the use of automated collection techniques to Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822), 1200 Pennsylvania Ave., NW, Washington, DC 20460. Include the OMB control number in any correspondence. Do not send the completed forms to this address.

This form must be completed by all owners or operators of Class I, II, and III injection wells and others who may be directed to apply for permit by the Director.

I. **EPA I.D. NUMBER** - Fill in your EPA Identification Number. If you do not have a number, leave blank.

II. **OWNER NAME AND ADDRESS** - Name of well, well field or company and address.

III. **OPERATOR NAME AND ADDRESS** - Name and address of operator of well or well field.

IV. **COMMERCIAL FACILITY** - Mark the appropriate box to indicate the type of facility.

V. **OWNERSHIP** - Mark the appropriate box to indicate the type of ownership.

VI. **LEGAL CONTACT** - Mark the appropriate box.

VII. **SIC CODES** - List at least one and no more than four Standard Industrial Classification (SIC) Codes that best describe the nature of the business in order of priority.

VIII. **WELL STATUS** - Mark Box A if the well(s) were operating as injection wells on the effective date of the UIC Program for the State. Mark Box B if wells(s) existed on the effective date of the UIC Program for the State but were not utilized for injection. Box C should be marked if the application is for an underground injection project not constructed or not completed by the effective date of the UIC Program for the State.

IX. **TYPE OF PERMIT** - Mark "Individual" or "Area" to indicate the type of permit desired. Note that area permits are at the discretion of the Director and that wells covered by an area permit must be at one site, under the control of one person and do not inject hazardous waste. If an area permit is requested the number of wells to be included in the permit must be specified and the wells described and identified by location. If the area has a commonly used name, such as the "Jay Field," submit the name in the space provided. In the case of a project or field which crosses State lines, it may be possible to consider an area permit if EPA has jurisdiction in both States. Each such case will be considered individually, if the owner/operator elects to seek an area permit.

X. **CLASS AND TYPE OF WELL** - Enter in these two positions the Class and type of injection well for which a permit is requested. Use the most pertinent code selected from the list on the reverse side of the application. When selecting type X please explain in the space provided.

XI. **LOCATION OF WELL** - Enter the latitude and longitude of the existing or proposed well expressed in degrees, minutes, and seconds or the location by township, and range, and section, as required by 40 CFR Part 146. If an area permit is being requested, give the latitude and longitude of the approximate center of the area.

XII. **INDIAN LANDS** - Place an "X" in the box if any part of the facility is located on Indian lands.

XIII. **ATTACHMENTS** - Note that information requirements vary depending on the injection well class and status. Attachments for Class I, II, III are described on pages 4 and 5 of this document and listed by Class on page 2. Place EPA ID number in the upper right hand corner of each page of the Attachments.

XIV. **CERTIFICATION** - All permit applications (except Class II) must be signed by a responsible corporate officer for a corporation, by a general partner for a partnership, by the proprietor of a sole proprietorship, and by a principal executive or ranking elected official for a public agency. For Class II, the person described above should sign, or a representative duly authorized in writing.

INSTRUCTIONS - Attachments

Attachments to be submitted with permit application for Class I, II, III and other wells.

A. **AREA OF REVIEW METHODS** - Give the methods and, if appropriate, the calculationsused to determine the size of the area of review (fixed radius or equation).The area of review shall be a fixed radius of 1/4 mile from the well bore unless the use of an equation is approved in advance by the Director.

B. **MAPS OF WELL/AREA AND AREA OF REVIEW** - Submit a topographic map, extending one mile beyond the property boundaries, showing the injection well(s) or project area for which a permit is sought and the applicable area of review. The map must show all intake and discharge structures and all hazardous waste treatment, storage, or disposal facilities. If the application is for an area permit, the map should show the distribution manifold (if applicable) applying injection fluid to all wells in the area, including all system monitoring points. Within the area of review, the map must show the following:

Class I

The number, or name, and location of all producing wells, injection wells, abandoned wells, dry holes, surface bodies of water, springs, mines (surface and subsurface), quarries, and other pertinent surface features, including residences and roads, and faults, if known or suspected. In addition, the map must identify those wells, springs, other surface water bodies, anddrinking water wells located within one quarter mile of the facility property boundary. Only information of public record is required to be included in this map;

Class II

In addition to requirements for Class I, include pertinent information known to the applicant. This requirement does not apply to existing Class II wells;

Class III

In addition to requirements for Class I, include public water systems and pertinent information known to the applicant.

C. **CORRECTIVE ACTION PLAN AND WELL DATA** - Submit a tabulation of data reasonably available from public records or otherwise known to the applicant on all wells within the area of review, including those on the map required in B, which penetrate the proposed injection zone. Such data shall include the following:

Class I

A description of each well's types, construction, date drilled, location, depth, record of plugging and/or completion, and any additional information the Director may require. In the case of new injection wells, include thecorrective action proposed to be taken by the applicant under 40 CFR 144.55.

Class II

In addition to requirement for Class I, in the case of Class II wellsoperating over the fracture pressure of the injection formation, all known wells within the area of review which penetrate formations affected by the increase in pressure. This requirement does not apply to existing Class II wells.

Class III

In addition to requirements for Class I, the corrective action proposed under 40 CFR 144.55 for all Class III wells.

D. **MAPS AND CROSS SECTION OF USDWs** - Submit maps and cross sections indicating the vertical limits of all underground sources of drinking water within the area of review (both vertical and lateral limits for Class I), their position relative to the injection formation and the direction of water movement, where known, in every underground source of drinking water which may be affected by the proposed injection. (Does not apply to Class II wells.)

E. **NAME AND DEPTH OF USDWs (CLASS II)** - For Class II wells, submit geologic name, and depth to bottom of all underground sources of drinking water which may be affected by the injection.

F. **MAPS AND CROSS SECTIONS OF GEOLOGIC STRUCTURE OF AREA** - Submit maps and cross sections detailing the geologic structure of the local area (including the lithology of injection and confining intervals) and generalized maps and cross sections illustrating the regional geologic setting. (Does not apply to Class II wells.)

G. **GEOLOGICAL DATA ON INJECTION AND CONFINING ZONES (Class II)** - For Class II wells, submit appropriate geological data on the injection zone and confining zones including lithologic description, geological name, thickness, depth and fracture pressure.

H. **OPERATING DATA** - Submit the following proposed operating data for each well (including all those to be covered by area permits): (1) average and maximum daily rate and volume of the fluids to be injected; (2) average and maximum injection pressure; (3) nature of annulus fluid; (4) for Class I wells, source and analysis of the chemical, physical, radiological and biological characteristics, including density and corrosiveness, of injection fluids; (5) for Class II wells, source and analysis of the physical and chemical characteristics of the injection fluid; (6) for Class III wells, a qualitative analysis and ranges in concentrations of all constituents of injected fluids. If the information is proprietary, maximum concentrations only may be submitted, but all records must be retained.

I. **FORMATION TESTING PROGRAM** - Describe the proposed formation testing program For Class I wells the program must be designed to obtain data on fluid pressure, temperature, fracture pressure, other physical, chemical, and radiological characteristics of the injection matrix and physical and chemical characteristics of the formation fluids.

For Class II wells the testing program must be designed to obtain data on fluid pressure, estimated fracture pressure, physical and chemical characteristics of the injection zone. (Does not apply to existing Class II wells or projects.)

For Class III wells the testing must be designed to obtain data on fluid pressure, fracture pressure, and physical and chemical characteristics of the formation fluids if the formation is naturally water bearing. Only fracture pressure is required if the program formation is not water bearing. (Does not apply to existing Class III wells or projects.)

J. **STIMULATION PROGRAM** - Outline any proposed stimulation program.

K. **INJECTION PROCEDURES** - Describe the proposed injection procedures including pump, surge, tank, etc.

L. **CONSTRUCTION PROCEDURES** - Discuss the construction procedures (according to §146.12 for Class I, §146.22 for Class II, and §146.32 for Class III) to be utilized. This should include details of the casing and cementing program, logging procedures, deviation checks, and the drilling, testing and coring program, and proposed annulus fluid. (Request and submission of justifying data must be made to use an alternative to packer for Class I.)

M. **CONSTRUCTION DETAILS** - Submit schematic or other appropriate drawings of the surface and subsurface construction details of the well.

N. **CHANGES IN INJECTED FLUID** - Discuss expected changes in pressure, native fluid displacement, and direction of movement of injection fluid. (Class III wells only.)

O. **PLANS FOR WELL FAILURES** - Outline contingency plans (proposed plans, if any, for Class II) to cope with all shut-ins or wells failures, so as to prevent migration of fluids into any USDW.

P. **MONITORING PROGRAM** - Discuss the planned monitoring program. This should be thorough, including maps showing the number and location of monitoring wells as appropriate and discussion of monitoring devices, sampling frequency, and parameters measured. If a manifold monitoring program is utilized, pursuant to §146.23(b)(5), describe the program and compare it to individual well monitoring.

Q. **PLUGGING AND ABANDONMENT PLAN** - Submit a plan for plugging and abandonment of the well including: (1) describe the type, number, and placement (including the elevation of the top and bottom) of plugs to be used; (2) describe the type, grade, and quantity of cement to be used; and (3) describe the method to be sed to place plugs, including the method used to place the well in a state of static equilibrium prior to placement of the plugs. Also for a Class III well that underlies or is in an exempted aquifer, demonstrate adequate protection of USDWs. Submit this information on EPA Form 7520-14, Plugging and Abandonment Plan.

R. **NECESSARY RESOURCES** - Submit evidence such as a surety bond or financial statement to verify that the resources necessary to close, plug or abandon the well are available.

S. **AQUIFER EXEMPTIONS** - If an aquifer exemption is requested, submit data necessary to demonstrate that the aquifer meets the following criteria: (1) does not serve as a source of drinking water; (2) cannot now and will not in the future serve as a source of drinking water; and (3) the TDS content of the ground water is more than 3,000 and less than 10,000 mg/l and is not reasonably expected to supply a public water system. Data to demonstrate that the aquifer is expected to be mineral or hydrocarbon production, such as general description of the mining zone, analysis of the amenability of the mining zone to the proposed method, and time table for proposed development must also be included. For additional information on aquifer exemptions, see 40 CFR Sections 144.7 and 146.04.

T. **EXISTING EPA PERMITS** - List program and permit number of any existing EPA permits, for example, NPDES, PSD, RCRA, etc.

U. **DESCRIPTION OF BUSINESS** - Give a brief description of the nature of the business.

EPA CLASS II INJECTION WELL PERMIT

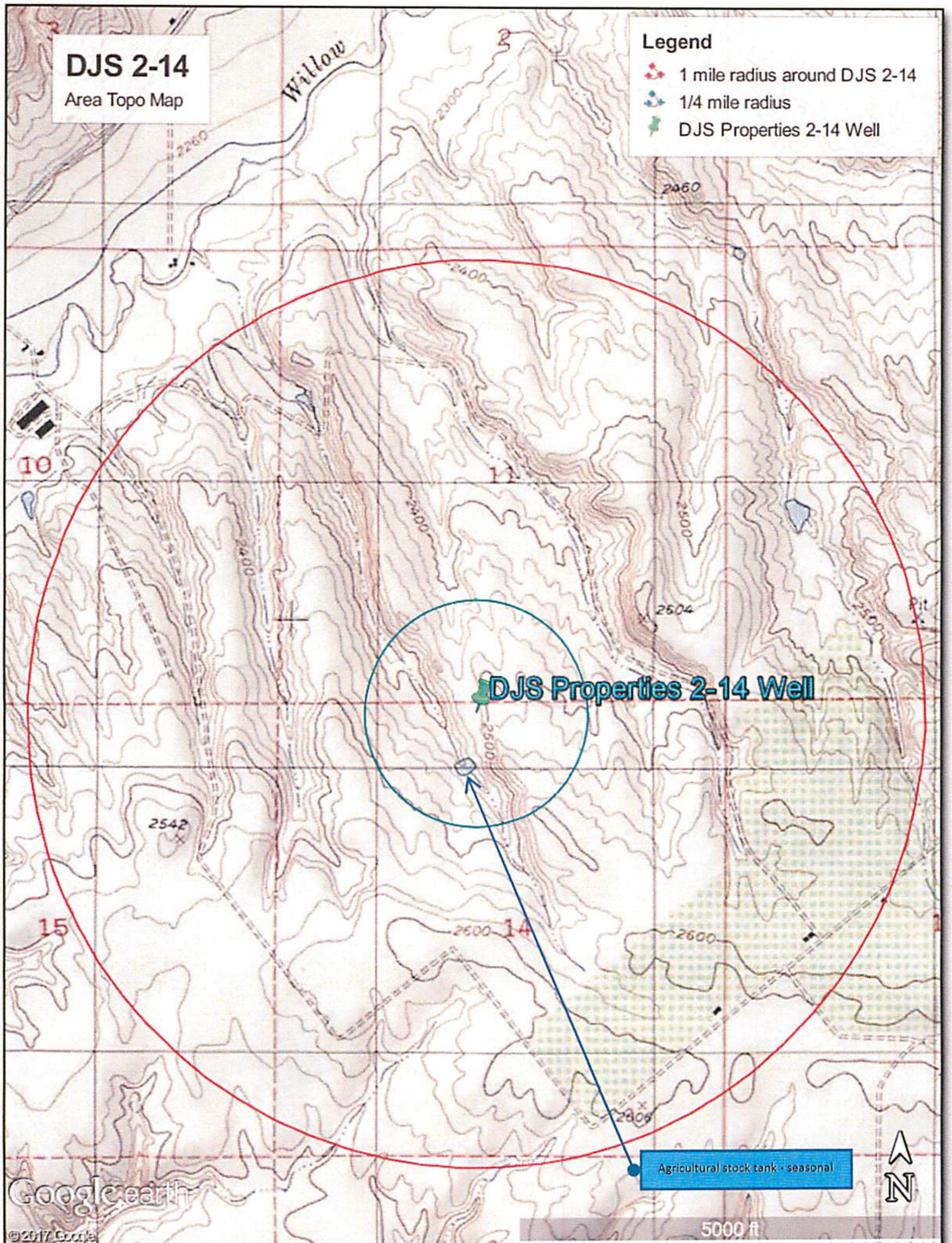
TABLE OF CONTENTS:

ATTACHMENT A

A. **AREA OF REVIEW** - 40 CFR 146.6 requires that the area of review (AOR) for each injection well or each field, project or area of the State be determined per either paragraph (a) or (b) of the regulation. Based on the remote location of the well and the lack of potential pathways which may cause the migration of the injection and/or formation fluid into an underground source of drinking water, Alta Mesa Services, LP has adopted the ¼ mile fixed radius to define the project AOR provided for in the regulations (i.e., 40 CFR 146.6(b)). Specifically, the AOR for this application encompasses a ¼ mile radius circle from the wellbore.

ATTACHMENT B

B. **MAPS OF WELL/AREA AND AREA OF REVIEW -** There are no notable wells, springs, water bodies, etc. within the 0.25 mile radius Area of Review.



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ATTACHMENT C

C. **CORRECTIVE ACTION PLAN AND WELL DATA** - There are no wells within the area of review.

ATTACHMENT E

E. **NAME AND DEPTH OF USDWs (CLASS II)** - The Pierce Gulch Aquifer (USDW) is regionally present in the area around the DJS Properties 2-14 Well. In the DJS Properties 2-14, sand is present from the surface to a depth of approximately 250' TVD.

ATTACHMENT G

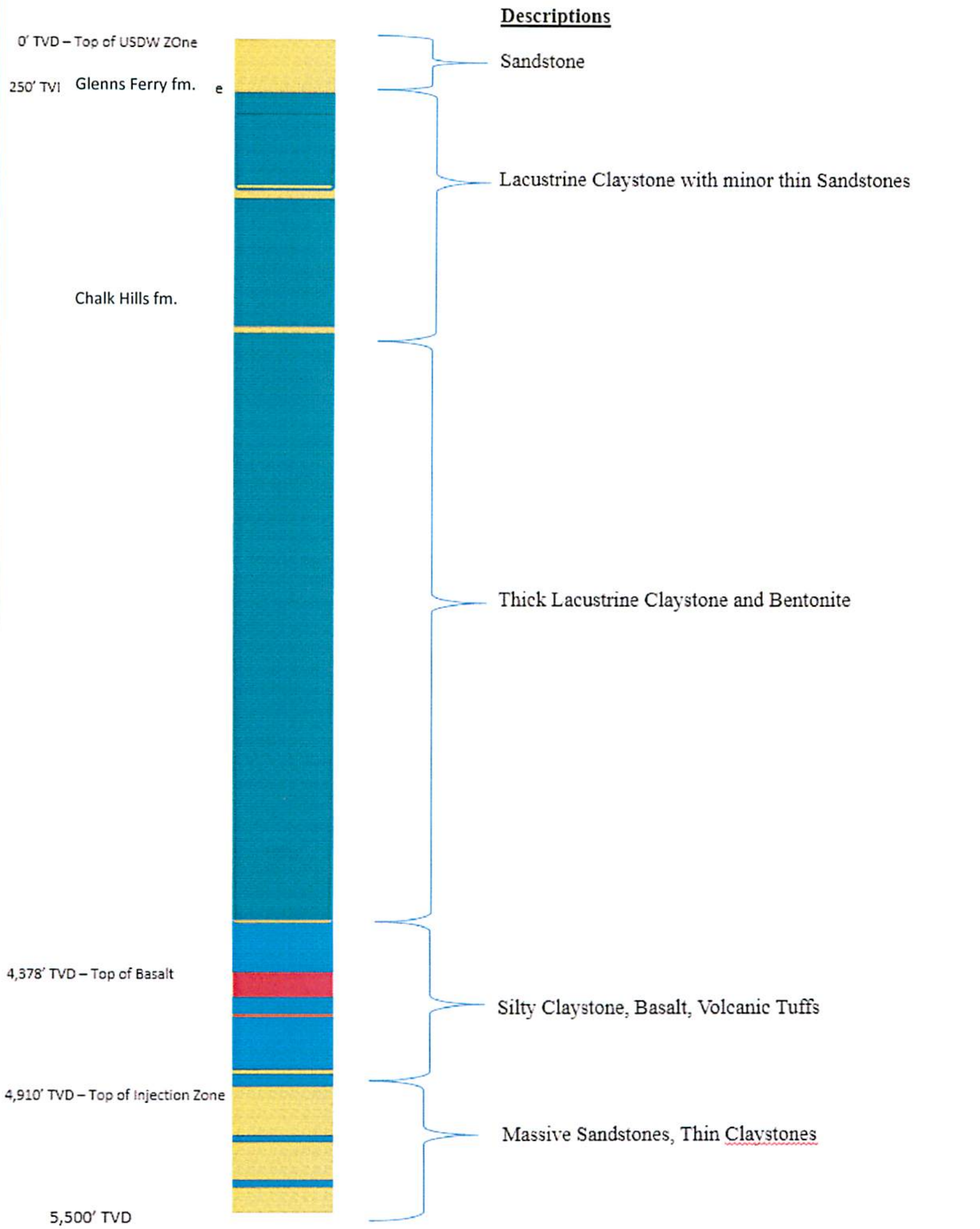
G. GEOLOGICAL DATA ON INJECTION AND CONFINING ZONES (Class II) - In the Alta Mesa Services, LP DJS Properties 2-14 the proposed injection zone is in a section of the Chalk Hills Formation, composed mainly of permeable quartz rich sandstone (See *Figure G-1* on next page). Per well log correlation the top of the injection zone occurs at 4,910' TVD and is 590' in gross thickness (5,500' Well TD). The confining zone is both the overlying Glenns Ferry Formation and the Chalk Hills formation. These formations are very widely distributed in this basin and are typically very impermeable claystones. (See *Figure G-2* on page 8). In the DJS Properties 2-14 well the Glenns Ferry formation (approx. 250'-1,600' TVD) is composed of highly impermeable lacustrine Claystone, as well as scattered arkosic sandstones. The Chalk Hills formation (approx. 1,600'-4,910'TVD) contains more lacustrine claystone, silicic volcanic ash, and basalt. Per well log correlation the top of the confinement zone is found at 250' TVD and is 4,660' thick. The Pierce Gulch Aquifer is found at the surface and is 250' thick. The Pierce Gulch aquifer is comprised of laminated sandstones interbedded with siltstones and clays.

Geology of the Injection Zone is described *on Figure G-3*, Pages 9-14.

Zone Function	Depth	Thickness	Geologic Name	Lithological Description
USDW Zone:	**Surface – 250' TVD**	**250'**	**Pierce Gulch Aquifer**	**Sandstone, Claystone/Siltstone**
Confining Zones:	**250' TVD**	**1,350'**	**Glenns Ferry Formation**	**Lacustrine Claystone**
	1,600' TVD- 4,910' TVD	**3,310'**	**Chalk Hills Formation**	**Lacustrine, Claystone and Fluvial Sediments, Silicic Volcanic Ash and Basalt**
Injection Zone:	**4,910' TVD to TD 5,510'TVD**	**590'**	**Chalk Hills Formation**	**Quartz Rich Sandstone**

The fracture pressure in the Chalk Hills Formation @5390' has been estimated at 3214 psi, based on a 12 ppg equivalent fluid density A leak off test will be run during the completion procedure to verify the fracture pressure of the confining zone as necessary. Dipole sonic data may become available prior to the completion construction procedure, and will be utilized instead of performing a leak off test to provide the capability to calculate Poisson's ratio and the associate frac gradients in the injection and confining zones. In addition, a step-rate test will be run prior to injection operations to determine actual fracture pressure in the injection zone. Injection operations will be controlled to always provide at least 50 psi below that pressure.

DJS 2-14 Composite Lithological Section *Figure G-1*



DJS 2-14 Proposed Injection Well – Regional Lacustrine Claystone Seal Map

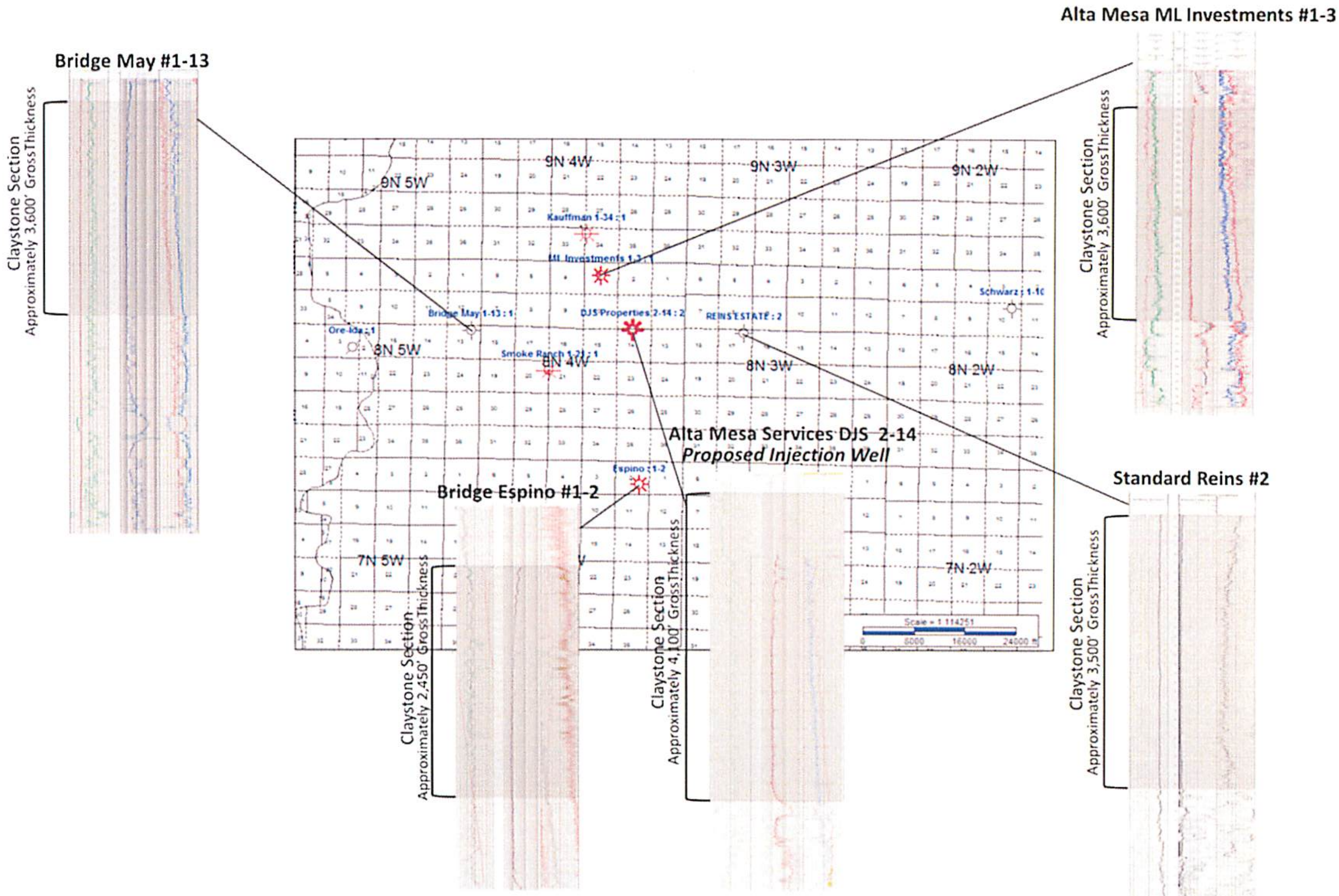


Figure G-3

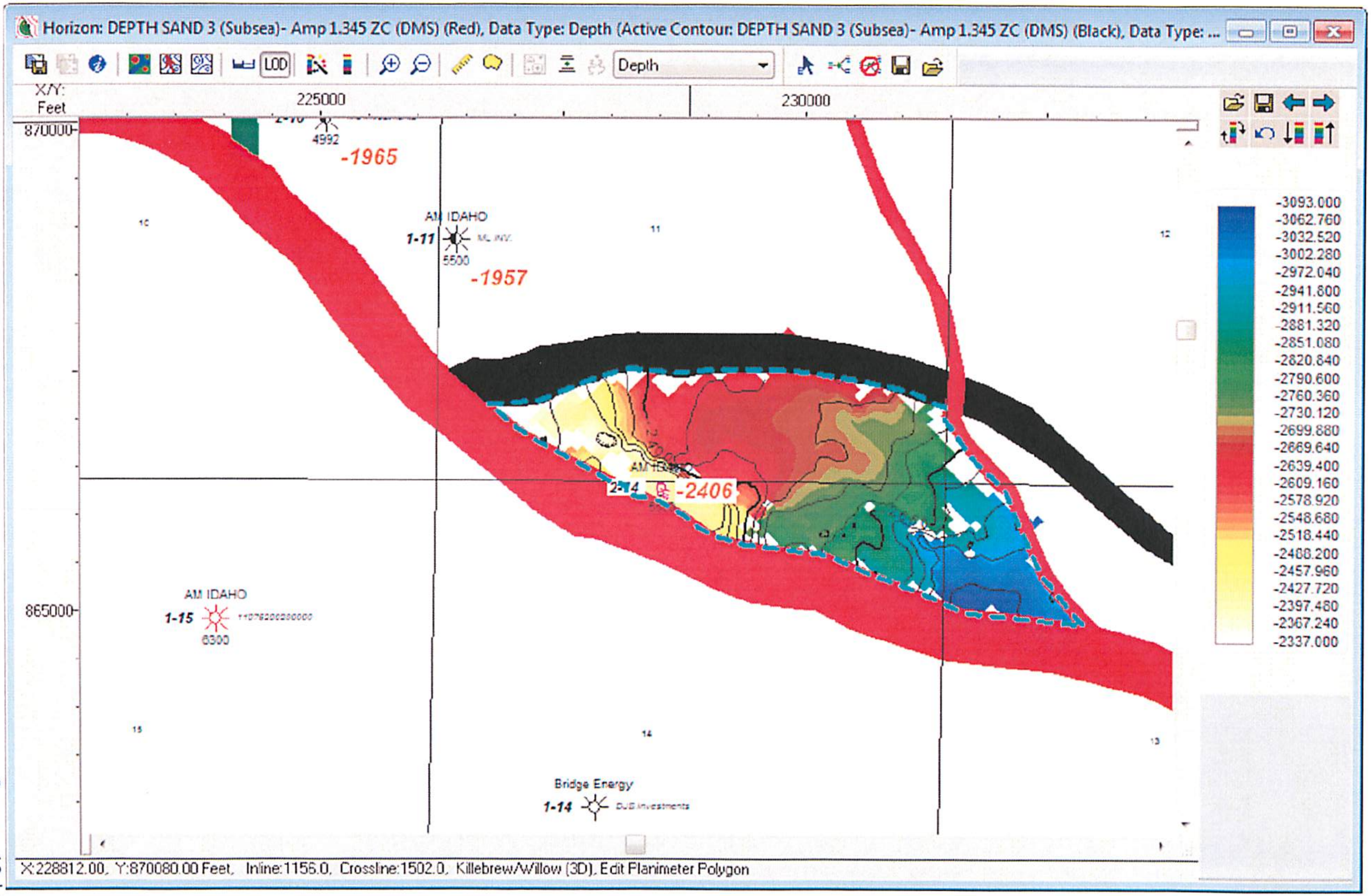
AM Idaho DJS #2-14 Proposed Disposal Well Geologic Setting

Township: 8 North - Range: 4 West - Section 14

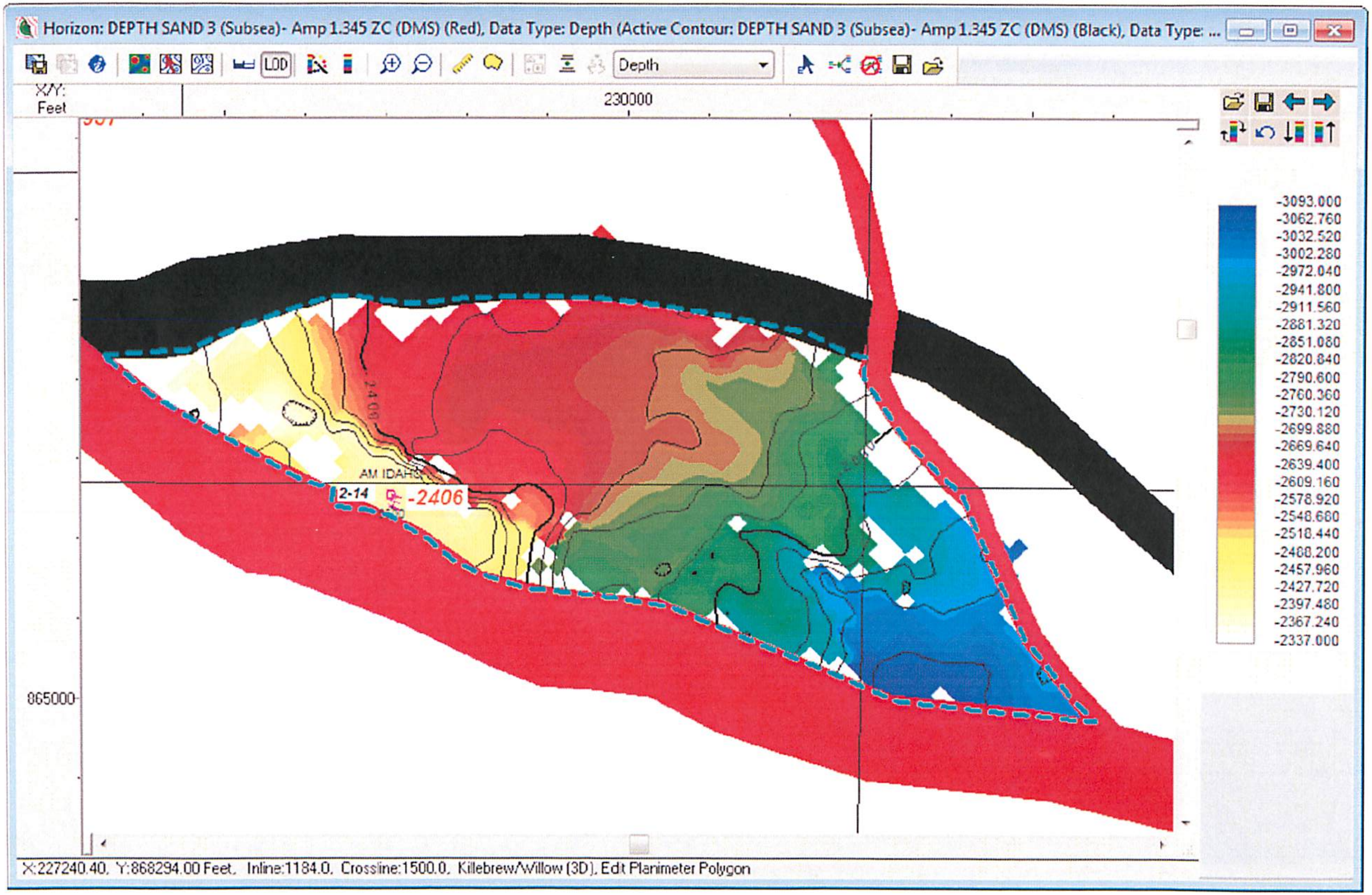
Payette County , Idaho

The following structure and Isopach maps were created from interpreting proprietary 3-D seismic data in conjunction with subsurface well control. Subsurface to seismic ties were done by making synthetic seismograms and verifying ties with seismic modelling. Due to the subsurface presence of basalts (very high acoustic impedance), the seismic to subsurface ties are excellent. The quality of the seismic data is very good to excellent, lending strong confidence to the interpretations Presented herein.

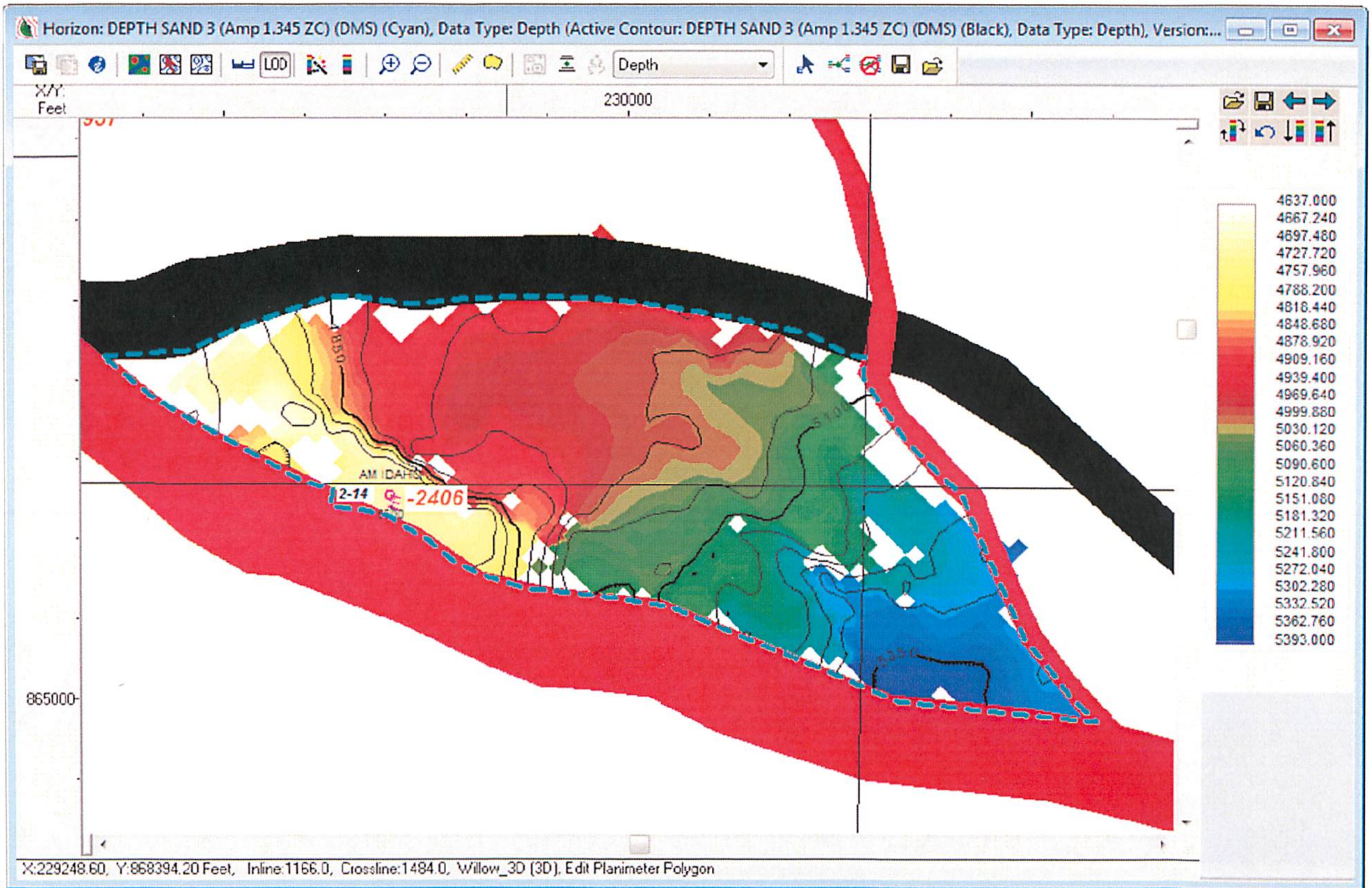
Structure Map (subsea): Top Sand 3
Proposed Injection Zone - Scale 1": 1000'



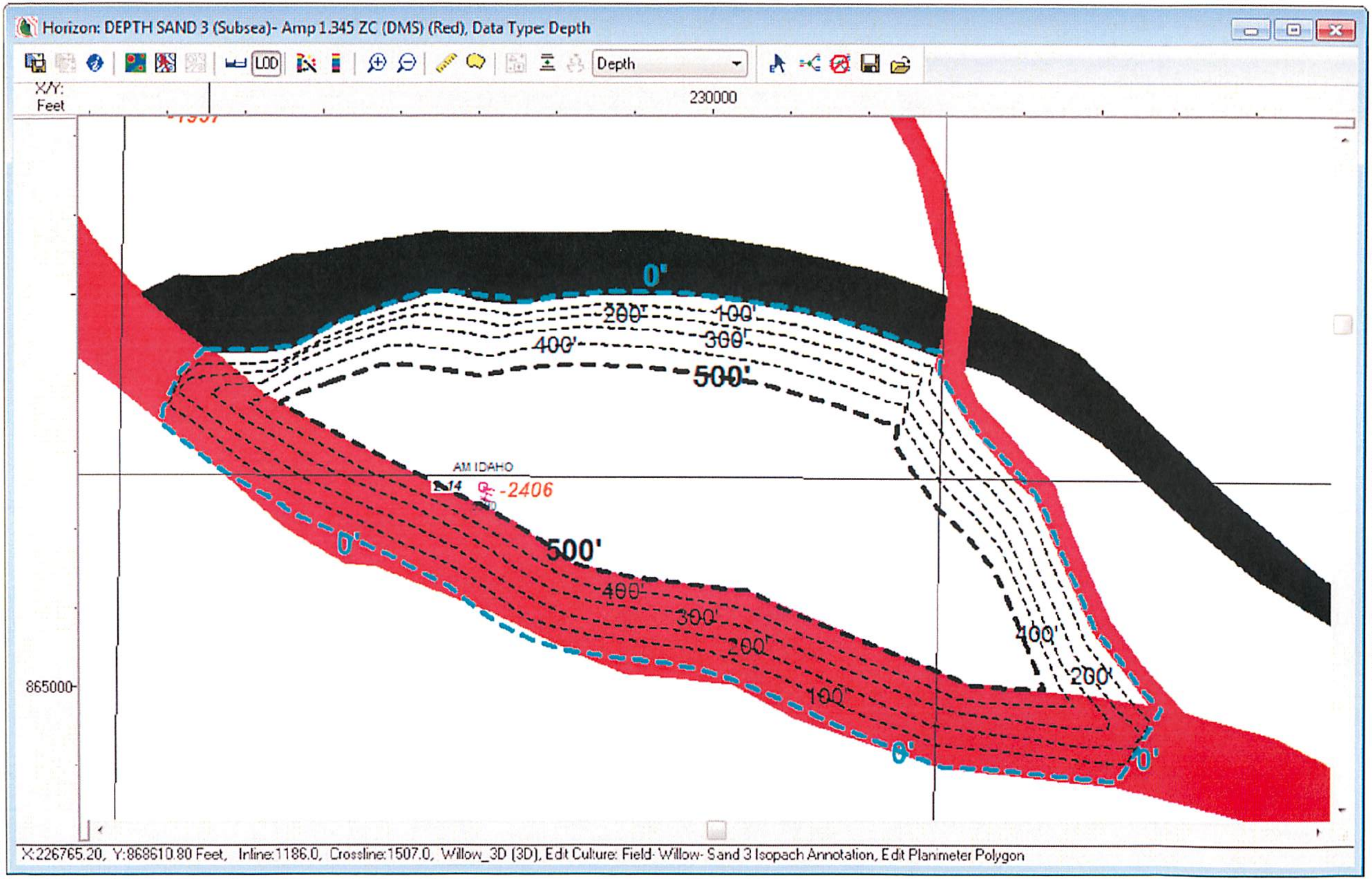
Structure Map (subsea): Top Sand 3
Proposed Injection Zone - Scale 1": 600'



Structure Map (below Ground level datum of 2300' ASL): Top Sand 3 Proposed Injection Zone - Scale 1": 600'

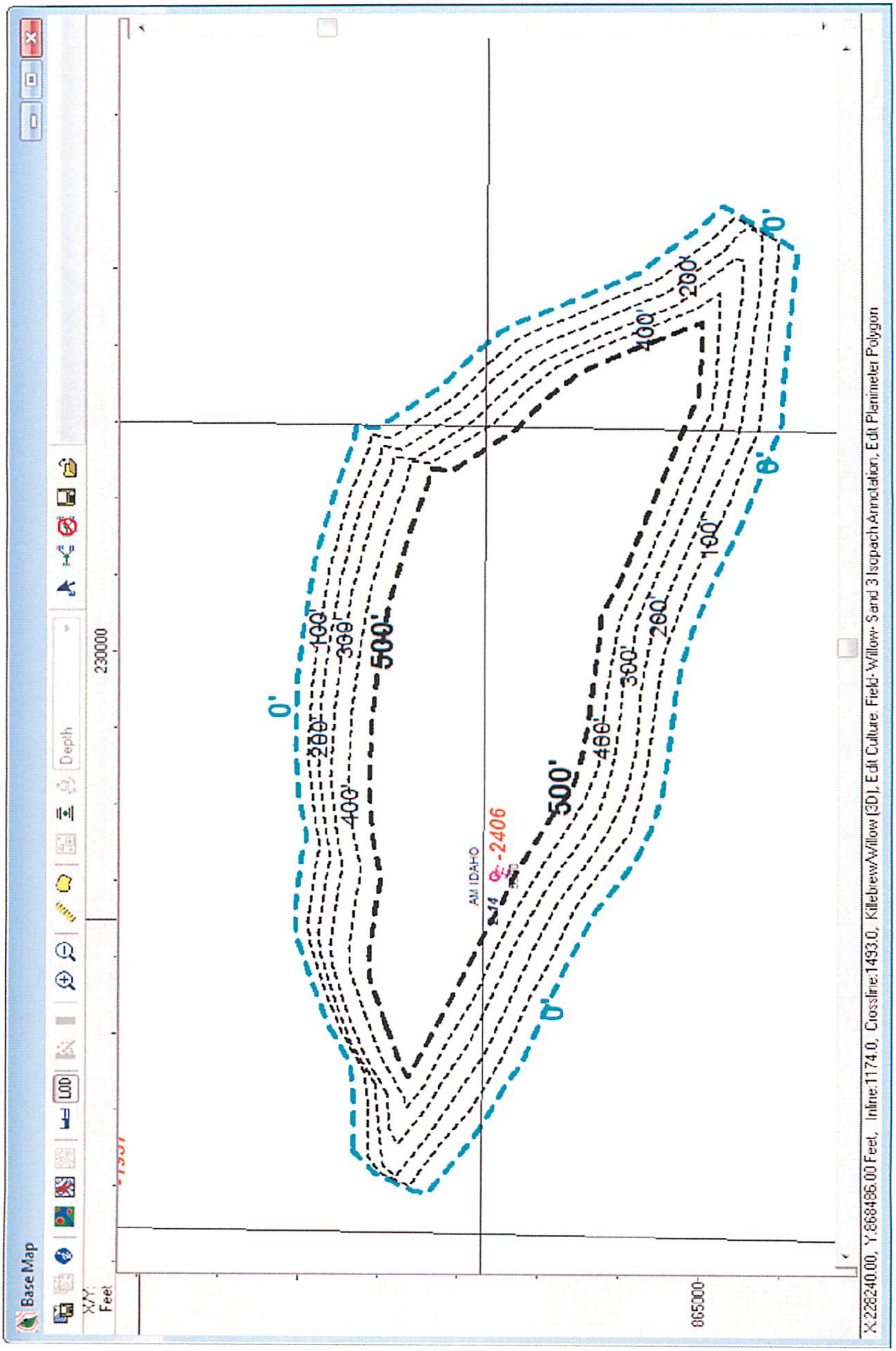


Isopach Map of Sands 3,4,5 –showing Faulting
100' Contour Interval – Scale 1":600'



DMS 9/2017

Isopach Map of Sands 3,4, & 5
Scale 1":600'



DMS 9/2017

ATTACHMENT H

H. OPERATING DATA – The expected average daily rate and volume is 1000 barrels per day (BPD) / 1000 barrels (BBL). The maximum daily rate and volume is expected to be 2600 BWPD / 2600 BBL, based on a mechanistic hydraulic model of the wellbore tubulars and the reservoir characteristics.

The average and maximum surface injection pressures are estimated to be 199 (psig) and 628 psig, respectively, based on the hydraulic model.

The tubing / casing annulus will be filled with 8.8 lb/gallon potassium chloride water, supplemented with an appropriate corrosion inhibitor, biocide, and oxygen scavenger chemical additive package.

A step-rate test will be performed after initial commissioning of the injection facilities and well. The step rate test will allow the reservoir parting pressure to be determined and subsequent injection rates will be limited to maintain injection pressures at least 50 psi below this pressure.

The source of the injection fluid is produced water, associated with the oil and gas production operations of wells operated by Alta Mesa in the surrounding area. An analysis of the produced water is attached (See below - Wastewater Characteristics, EPA Methods). The produced water in this area is very low salinity and low TDS since the geologic sedimentary history is that of a lacustrine nature.

Wastewater Characteristics, EPA Methods

Alta Mesa	Date	Alkalinity (mg CaCO3/L)	Barium (mg/L)	BOD (mg?L)	Boron (mg/L)	Calcium (mg/L)	Chloride (mg/L)	COD (Mg/L)	Conductivity (µmhos/cm)	Cyanide (free) (mg/L)	Fluoride (mg/L)	Hexane extractable material (HEM) (mg/L)	Gross Alpha (pCi/L)	Gross Beta (pCi/L)	Iron (mg/L)	Manganese (mg/L)	Mercury-CVAFS (mg/L)	NO3/N (mg/L)	Potassium ...(mg/L)	Radium 226 (pCi/L)	Radium 228 (pCi/L)	Methanol (mg/L)	Silica (as SiO2) (mg/L)	Silicon (mg/L)	Sodium (mg/L)	TDS (mg/L)	TSS (mg/L)	Strontium (mg/L)	Sulfate (mg/L)	MBAS (mg/L)	Turbidity (NTU)
WP4-1	March 13, 2017	525	0.315	>38.0	7.61	70.7	874	277	4320	0.0131	1.89	7.2	0.120 +/- 5.49	592 +/- 31.8	2.54	0.240	4.31	0.477		0.516 +/- 0.292	0.972 +/- 0.220	9470	50.9	23.8	404	2910	12.4	2.15	47.3	0.137	9.66
Tank Battery	May 23, 2016	419	0.144		6.93	16.1	143		1700	0.0197	7.77		0.013 +/- 1.62	20.4 +/- 4.00	2.33		0.476		40.8	0.05 +/- 0.10	-0.136 +/- 0.555	667	77.5	36.2	314	1420	15.7	0.508	9.58	0.166	48.5

Wastewater Characteristics, EPA Methods

Alta Mesa	Date	Diesel (mg/L)	Lube Oil (mg/L)	Gasoline (mg/L)	1,2,4-Trimethylbenzene (ug/L)	1,3,5-Trimethylbenzene (ug/L)	Acetone (ug/L)	Benzene (ug/L)	Ethylbenzene (ug/L)	Isopropylbenzene (ug/L)	m+p-Xylene (ug/L)	Methyl ethyl ketone (MEK) (ug/L)	Naphthalene (ug/L)	n-Propylbenzene (ug/L)	o-Xyllene (ug/L)	Toluene (ug/L)	1-Methylnaphthalene (ug/L)	2,4-Dimethylphenol (ug/L)	2-Methylnaphthalene (ug/L)	2-Methylphenol (ug/L)	3+4--Methylphenol (ug/L)	Bis(2-Ethylhexyl)phthalate (ug/L)	Fluorene (ug/L)	Naphthalene (ug/L)	Phenanthrene (ug/L)	Phenol (ug/L)	Pyrene (ug/L)
WP5-1 3:00 p.m.	March 13, 2017	438		80.2	178	103	1390	20000	657	41.4	2500	587	44.2	37.4	729	11500											
WP4-1 2:30 p.m.	March 13, 2017	43.1		71.3	182	103	1380	19400	695	40.0	2710	580	48.4	34.8	805	11100	28.4	581	57.0	1020	1590	4.24		74.1		2200	
Tank Battery	May 23, 2016	32.3	7.48	38.4	257	127	13500	24800	1080		4170		59.2		1150	17800	116	571	245	1330	1880	22.3	16.7	265	48.5	3270	21.3

A calculation of the expected injection reservoir capacity was performed. This calculation assumes a confined reservoir pore space as defined by the isopach of the injection zone in a fault block bounded on 3 sides by faults (see Attachment G for details). The bulk volume is calculated by determining the area of each isopach interval and using the average of the areas to calculate the total bulk injection reservoir volume. A porosity of 23% is estimated from open hole wireline logs for the injection interval. Water saturation is estimated at 80%, with a complimentary 20% gas saturation. This is based on the swab test of the 5380-5390 perforations, where gas blows were experienced and a water sample showed the presence of Benzene and other VOC's naturally associated with water associated with hydrocarbon reservoirs. The average net reservoir to bulk thickness ratio is estimated at 90% from a review of the mud log for this interval. The pore space is estimated to contain 152 million reservoir barrels. Under confined injection, the water, gas, and pore space will compress and expand respectively to allow for water influx as pore pressure increases. The maximum allowable pressure is defined by staying 10% below fracture pressure. Fracture pressure is estimated to be equivalent to a 12 lb/gallon gradient (3214 psi at 5150'). Note that the actual parting pressure will be well defined upon completion of the well by the execution of a step rate test. The original pressure is estimated at a pressure equal to an 8.6 lb/gallon equivalent pressure gradient (2276 psi at 5150'). The maximum allowable pressure used in the calculation of Injection Zone Capacity is 90% of the fracture pressure (90% of 3214 = 2892 psi). This provides for an allowable increase in the reservoir pressure of 616 psi (2892-2276). Water, gas, and pore space compressibility's are estimated using standard oil and gas industry correlations. Based on the original reservoir volume, along with the allowable pressure increase and the sum of the compressibilities, it is estimated that a total of 7,773 thousand reservoir barrels can be injected into this space before the pressure limit is reached. This equates to 7,368 thousand stock tank barrels based on a water reservoir volume factor of 1.055 RB/STB.

Calculation of Confined Injection Zone Capacity

DJS Properties #2-14 Injection Zone

Calculation of Reservoir Volumes:

Porosity	0.23	fraction	from well log
Sw	0.80	fraction	water saturation - evidence of gas in swab testing and water analysis
Sg	0.20	fraction	gas saturation - evidence of gas in zone from swab testing - residual gas
Gross Volume	94,700	acre-ft	from planimetry calculations below
Net/Gross Ratio	0.90	fraction	from well logs
Pore Volume	19,603	acre-ft	

Reservoir Isopach Area Planimeter Readings:

CONTOUR LINE VALUE	AREA > (acres)	RATIO OF AREAS	DELTA CONTOUR (ft)	DELTA VOLUME (acre-ft)	
0	269.00				
100	234.00	0.8699	100	25,150.0	
200	205.00	0.8761	100	21,950.0	
300	173.00	0.8439	100	18,900.0	
400	144.00	0.8324	100	15,850.0	
500	113.00	0.7847	100	12,850.0	
		TOTAL ==>		94,700.0	acre-ft - gross bulk reservoir volume

Injection Zone Capacity

Item	Value	Units	Comments - notes
Datum Depth:	5150	ft, BGL	average depth of injection zone
Average Temperature	251	deg F	ML Investments 1-3 production log
Initial Pressure:	2276	psi	8.6 ppg equivalent pore pressure at datum depth
Fracture Pressure:	3214	psi	12 ppg equivalent pore pressure at datum depth
Maximum Allowable Pressure	2892	psi	90% of fracture pressure
Maximum Pressure Increase (dP)	616	psi	maximum allowable pressure less initial pressure
Average Pressure	2584	psi	average of initial pressure and maximum allowable pressure
Water Salinity	750	ppm Cl	estimated average
Water Compressibility	3.48E-06	1/psi	Osif's Correlation
Gas Compressibility	3.87E-04	1/psi	Meehan et al, Gas gravity = 0.65 from ML Investments 1-10 Well
Rock pore volume compressibility	3.50E-06	1/PSI	Hall's Correlation
Reservoir Water Volume Initial	15,682	acre-ft	Pore Volume * Sw
Reservoir Water Volume Initial	121,663,439	RBbls	Pore Volume * Sw
Reservoir Water Volume Compression	261,022	RBbls	dP * water compressibility* initial water volume
Reservoir Gas Space Volume Initial	3,921	acre-ft	Pore Volume * Sg
Reservoir Gas Space Volume Initial	30,415,860	RBbls	Pore Volume * Sg
Gas Pore Space Compression	7,250,191	RBbls	dP * gas compressibility * initial gas volume
Pore Space Volume Increase	262,281	Rbbls	dP * pore space compressibility
Total Pore Space volume increase	7,773,494	RBbls	sum of water, gas, and pore space compression
Bw (water formation volume factor):	1.055	RBbl/STBbl	McCain's Correlation
Total Stock Tank Barrels Capacity	**7,368,241**	**STBbls**	adjust to surface conditions by dividing by water formation volume factor (Bw)

Stock tank barrels are measured at atmospheric pressure and 60 degrees F.

ATTACHMENT I

I. **FORMATION TESTING PROGRAM** – A step rate test will be run at the time of initial completion to determine the actual parting pressure of the injection interval after the packers and tubing is installed. The water used in this test will be from the same source as the proposed source water. Surface injection pressure and injection rates will be measured during the step rate test. The determination of bottom hole parting pressure will be indicated by a departure in the injectivity ratio (dRate/dPressure) when the parting pressure is exceeded. The pressure defined by the intersection of the slopes of the injectivity data below and above parting pressure will define the surface maximum injection pressure. All injection operations will be held to 50 psi or more below this pressure to assure that fracturing of the injection interval does not occur. Bottom hole pressures will be calculated based on the density of the fluid being injected, along with surface pressure measurements. Water samples were collected and analyzed on the interval at 5380-90' and is believed to be representative of the entire interval being proposed for injection.

ATTACHMENT J

J. **STIMULATION PROGRAM –** No stimulation program is expected to be needed. The sandstone in this area has good permeability and the unstimulated injectivity should be sufficient.

ATTACHMENT K

K. **INJECTION PROCEDURES** – Individual monitoring of the DJS Properties #2-14 is planned. Gauges will be installed at the wellsite, and a flow meter will be installed at the pump station. Casing pressure will be maintained at 0 psig. If any pressure is noted on the annulus between the tubing and the production casing, injection will immediately be halted. Injection will not be resumed until the source of the pressure has been identified and repaired. Injection pressure at the wellhead on the tubing will be maintained 50 psi below parting pressure. An initial step-rate test will be performed to determine parting pressure to beginning injection operation. Produced water will be gathered into stock tanks and through additional settling and filtration vessels, as necessary to assure clean water is pumped downhole. A polish filter will be installed at the wellhead to catch any solids that make their way to the wellhead. An injection pump will be located near the stock tanks to pressurize the water and transport the water via flowline to the wellhead. A pressure relief valve will be installed on the pump to prevent excessive pressure from being placed on the flowline. This relief valve will be piped back to the source tanks or to the intake of the pump. Source water will be provided by the producing wells. The flowline will be buried below grade to avoid freezing issues. The portion of the flowline above grade will have insulation and heat tracing to avoid freezing during winter operations. The flowline easement and wellhead will be visually inspected daily (within reason, due to considerations of weather and other force majeure) by field operating personnel.

ATTACHMENT L

L. CONSTRUCTION PROCEDURES –

Historical:

Spud well 9/11/2014. Surface hole was drilled with 12 ¼" bit to 1093'. 9 5/8" 40 lb/ft K-55 LTC casing was then set at 1082' and was cemented back to surface. An 8.75" hole was drilled to 5,500' and production casing was then run and cemented (7" 26 lb/ft J-55 LTC casing with bow spring centralizers). A top down cement job was then performed on the 7" casing, to provide cement coverage between the production casing and the surface casing down below the shoe of the surface casing. The prospective hydrocarbon intervals were then tested by perforating and flow/swab tested each of 5 intervals between 5390' and 4306'. All tested non-commercial. The first zone at 5380-5390' did have good gas blows during swabbing. Cement retainers or bridge plugs were set between intervals during the testing operations which proceded from the bottom to the top interval, and was also placed above last interval after testing. Testing was completed by 11/3/2014. See attached wellbore diagram.

Planned Injection Completion Construction:

1. Move in workover rig.
2. Pressure test casing above bridge plug at 4,294'
3. Drill out top plug and cement squeeze perforations in the interval 4,306' – 4,374'.
4. Drill out squeeze and test same. Re-squeeze as necessary.
5. Drill out plugs and retainers to below float collar to 5,450'. If dipole sonic data is not available, run leak-off test prior in the Confining Zone to verify fracture gradient in the Confining Zone.
6. Add perforations in interval 5390 – 5410'.
7. Run tubing, packer and isolation packer to 4880' and set upper packer at 4200'. (see attached wellbore diagram)
8. Hang off tubing and install wellhead assembly.
9. Run step rate test with actual produced water to determine parting pressure and injectivity.
10. Connect gauges and filter pod, flowline, pump, and commission injection system.

ATTACHMENT M

M. **CONSTRUCTION DETAILS** – See the following pages for wellbore schematics.

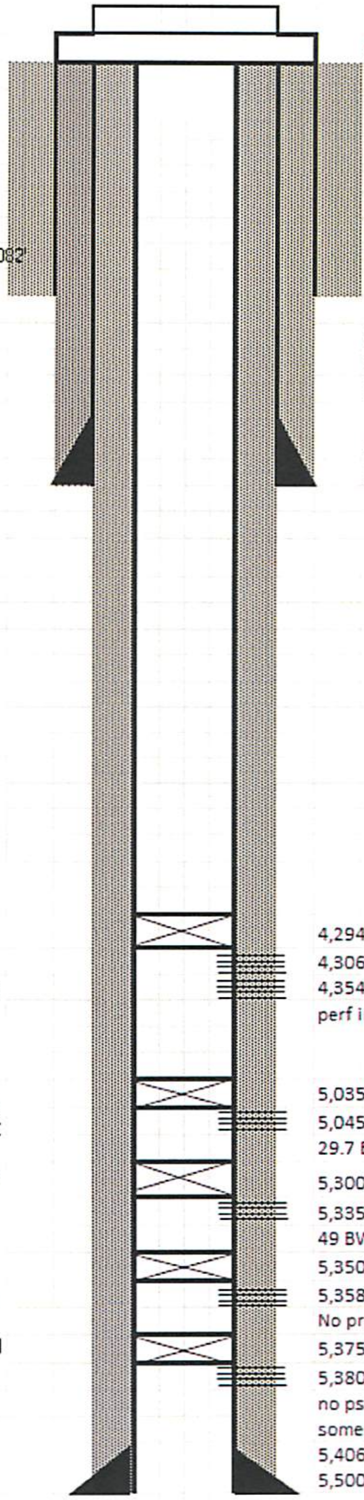
Alta Mesa Holdings **DJS Properties 2-14**

Willow Field - Payett County, ID

Current Wellbore Diagram as of 11/3/2014 - Well Temporarily Abandoned

Spud 9/12/2014 T&A'd 11/3/2014

GL Elevation above MSL: 2,488'



Casing & Cement

Conductor **:** 13 3/8 OD, @ 80'

Surface: 24 jts, 9-5/8" OD, 8.83 ID,40#, K-55 @ 1,082'
215 Sacks, (144 Bbls) Type III Cement + Slurrylite 50 Pps, 20% MS-500, 5% HW Gypsum, 5% Salt B.W.O.W., 0.75% TSFL-180, 0.25% CFL-300, 3.77 ft3/sk, 14.22 gal/sk, 10.4 ppg. Followed by 70 sacks, (17 Bbbls) Type III Cement + 5% Salt B.W.O.W., 1.36 ft3/sk, 6.42 gal/sk, 14.8 ppg.

Pump Top Job as Follows: Pump 116 sacks (23 Bbls) Calprem Cement + 2% Cacl2, 1.15 ft3/sk, 5 gal/sk, 15.8 ppg. Pump Top out cement @ 1.0 Bpm & 100 psi. (4 Bbls Cement to surface)

Production: 7" OD, 6.276" ID, J-55 @5.500'
Run 122 Total joints of 7", 26# J-55, LTC Casing as follows:
Float Shoe set @ 5,500', 2 Joints of Casing, Float collar set @ 5,406', 120 Joints of casing. Ran 64 Total 7" X 8 1/2" Bow Spring Centralizers, 1- Centralizer 10' above Shoe, 1- Centralizer on 1st casing Collar, 1- Centralizer 10' Below Float Collar, Centralizer on every Joint to Joint # 44 @ 3,509'. Then every 4th Joint to Joint #120 @ 80'. Centralizers Where Installed on collars on Casing Joints. Filled & circulated every 20 joints (No tight hole or problems Running Casing) (Tag with Joint #122 @ 5,500');

Cement as Follows: Pump 10 bbls of Diesel, 25 bbls of 10.0 Ppg Weighted Spacer @ 4.0 Bpm and 250 psi, Followed by 400 Sacks, (129 Bbls) TCI lite 61.6 Pps, Class G Cement, 25.9 Pps Flyash, 5.22 Pps gel, 1.82 ft3/sk, 9.72 gal/sk, 12.7 ppg. Pump Lead cement @ 3 Bpm & 340 psi. Followed by 265 Sacks, (54.7 Bbbls) Gas Seal Cement, Class G Cement, 3% Salt, 0.75% TSFL-180, 0.2% C-49, 1.16 ft3/sk, 4.9 gal/sk, 16.0 ppg. Pump Tail cement @ 3 Bpm & 239 psi. Displace with 208 Total Bbls as Follows: 152 Bbls 4% KCL Water @ 2 Bpm & 1300 Psi, (Lost Returns With 152 Bbls Displacement Away) (No Returns on last 56 Bbls) Pumped last 56 Bbls Displacement @ 1 Bpm & 3,700 Psi. (Bumped plug With 4,200 psi) Bleed off 2.5 Bbls, Check Floats, Floats Held Good. (No Spacer or Cement to Surface)

Pumped 9 cubic yards cement top-down job.

Well Name & No.: DJS Properties 2-14	Field: Willow
County: Payette	State: Idaho
Total Depth (MD): 5,500'	(TVD) 5,500'
Date Completed: T&A on 11/3/2014	Latest Revision Date: 2/3/2015

EPA – UNDERGROUND INJECTION CONTROL PERMIT APPLICATION ATTACHMENTS

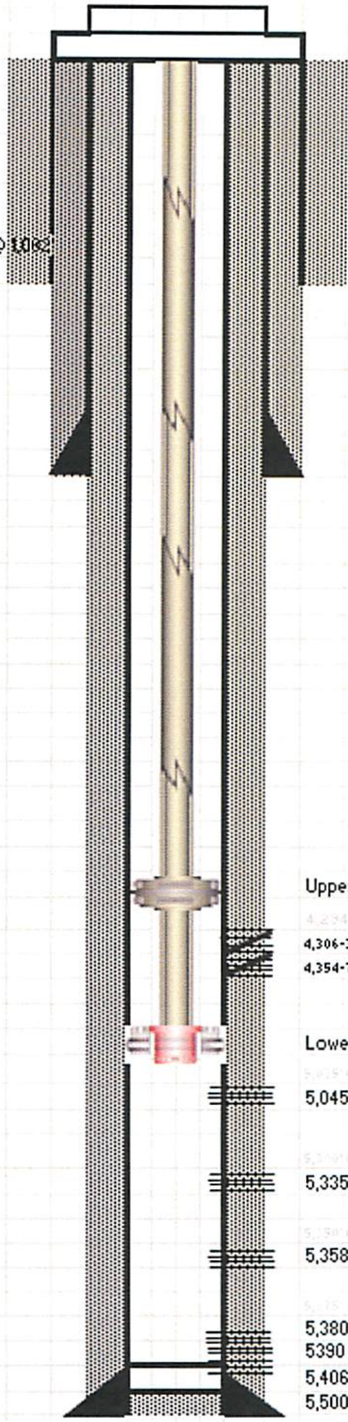
Alta Mesa Holdings **DJS Properties 2-14**

Willow Field - Payett County, ID

Proposed Injection Completion Configuration

Spud 9/12/2014 T&A'd 11/3/2014

GL Elevation above MSL: 2,488'



5K Dual - Master Single Wellhead

Casing & Cement

Conductor : 13 3/8 OD, @ 80'

Surface: 24 jts, 9-5/8" OD, 8.83 ID,40#, K-55 @ 1,082'

215 Sacks, (144 Bbls) Type III Cement + Slurrylite 50 Pps, 20% MS-500, 5% HW Gypsum, 5% Salt B.W.O.W., 0.75% TSFL-180, 0.25% CFL-300, 3.77 ft3/sk, 14.22 gal/sk, 10.4 ppg. Followed by 70 sacks, (17 Bbbls) Type III Cement + 5% Salt B.W.O.W., 1.36 ft3/sk, 6.42 gal/sk, 14.8 ppg.

80' 14" Conductor Cmt?????

24 jts 9 5/8" casing
1,034' set float collar
1 Joint 9 5/8" casing
— Surface Casing

1,057' TOC
1,082' set float Shoe

Pump Top Job as Follows: Pump 116 sacks (23 Bbls) Calprem Cement + 2% Cacl2, 1.15 ft3/sk, 5 gal/sk, 15.8 ppg. Pump Top out cement @ 1.0 Bpm & 100 psi. (4 Bbls Cement to surface)

Production: 7" OD, 6.276" ID, J-55 @5.500'
Run 122 Total joints of 7", 26# J-55, LTC Casing as follows:

Float Shoe set @ 5,500', 2 Joints of Casing, Float collar set @ 5,406', 120 Joints of casing. Ran 64 Total 7" X 8 1/2" Bow Spring Centralizers, 1- Centralizer 10' above Shoe, 1- Centralizer on 1st casing Collar, 1- Centralizer 10' Below Float Collar, Centralizer on every Joint to Joint # 44 @ 3,509'. Then every 4th Joint to Joint #120 @ 80'. Centralizers Where Installed on collars on Casing Joints. Filled & circulated every 20 joints (No tight hole or problems Running Casing) (Tag with Joint #122 @ 5,500');

Cement as Follows: Pump 10 bbls of Diesel, 25 bbls of 10.0 Ppg Weighted Spacer @ 4.0 Bpm and 250 psi, Followed by 400 Sacks, (129 Bbls) TClite 61.6 Pps, Class G Cement, 25.9 Pps Flyash, 5.22 Pps gel, 1.82 ft3/sk, 9.72 gal/sk, 12.7 ppg. Pump Lead cement @ 3 Bpm & 340 psi. Followed by 265 Sacks, (54.7 Bbbls) Gas Seal Cement, Class G Cement, 3% Salt, 0.75% TSFL-180, 0.2% C-49, 1.16 ft3/sk, 4.9 gal/sk, 16.0 ppg. Pump Tail cement @ 3 Bpm & 239 psi. Displace with 208 Total Bbls as Follows: 152 Bbls 4% KCL Water @ 2 Bpm & 1300 Psi, (Lost Returns With 152 Bbls Displacement Away) (No Returns on last 56 Bbls) Pumped last 56 Bbls Displacement @ 1 Bpm & 3,700 Psi. (Bumped plug With 4,200 psi) Bleed off 2.5 Bbls, Check Floats, Floats Held Good. (No Spacer or

Pumped 9 cubic yards cement top down surface job.

Upper packer at 4200'

4,306-30' perf w/ 2" RTG x 4 JSPF x 120 deg ph (11/1/14), to be squeezed

4,354-74' perf w/ 2" RTG x 4 JSPF x 120 deg ph (11/1/14), to be squeezed

Lower packer at 4860'

5,045-50' perf w/ 2" RTG x 4 JSPF x 120 deg ph (10/28/14)

5,335-38' perf w/ 2" RTG x 4 JSPF x 120 deg ph (10/27/14)

5,358-60' perf W/ 3 1/8" csg gun, 4 JSPF x 90 deg ph (10/24/14)

5,380-90' perf W/ 4 JSPF x 90 deg ph (10/22/14)
5390 - 5410 perfs to be added
5,406' float collar - drilled out. PBTD 5450'.
5,500 float shoe

5,500' TVD

Well Name & No.: DJS Properties 2-14	Field: Willow
County: Payette	State: Idaho
Total Depth (MD): 5,500'	(TVD) 5,500'
Date Completed: T&A on 11/3/2014	Latest Revision Date: 2/3/2015

ATTACHMENT O

O. PLANS FOR WELL FAILURES -- The potential areas of concern for this type well are three points: 1) packer to casing seal, 2) tubing connections or tubing body leak, or 3) tubing hanger seals. For any of these components a leak will be indicated by the existence of pressure on the tubing / casing annulus pressure gauge. These type of leaks will be contained within the wellbore envelope. If pressure is observed on the casing gauge, injection operations will immediately cease. The wellhead will be isolated by closing in all wellhead valves and the pump and flowline valves will be closed. The tubing hanger seals will be inspected using a wellhead service company technician who can pressure test the seals for leaks. After this testing is done, a workover rig will be utilized to repair the leaking seals or to pull the tubing and packer so that they can be inspected for leaks and replaced as necessary. Injection will not be reinstated until the leak is repaired and the annulus is pressure tested to verify integrity of the injection components.

Mechanical integrity tests will be run periodically according to permit requirements by applying pressure on the annulus between the production casing and the tubing. This test is designed to detect any production casing weakness. If any leaks are noted, injection operations will not resume until the leak is located and repaired.

ATTACHMENT Q

Q. PLUGGING AND ABANDONMENT PLAN – See proposed Post-Injection Plugging Configuration wellbore diagram and associated EPA Form 7520-14 which details the proposed plugging and abandonment plan for this well.

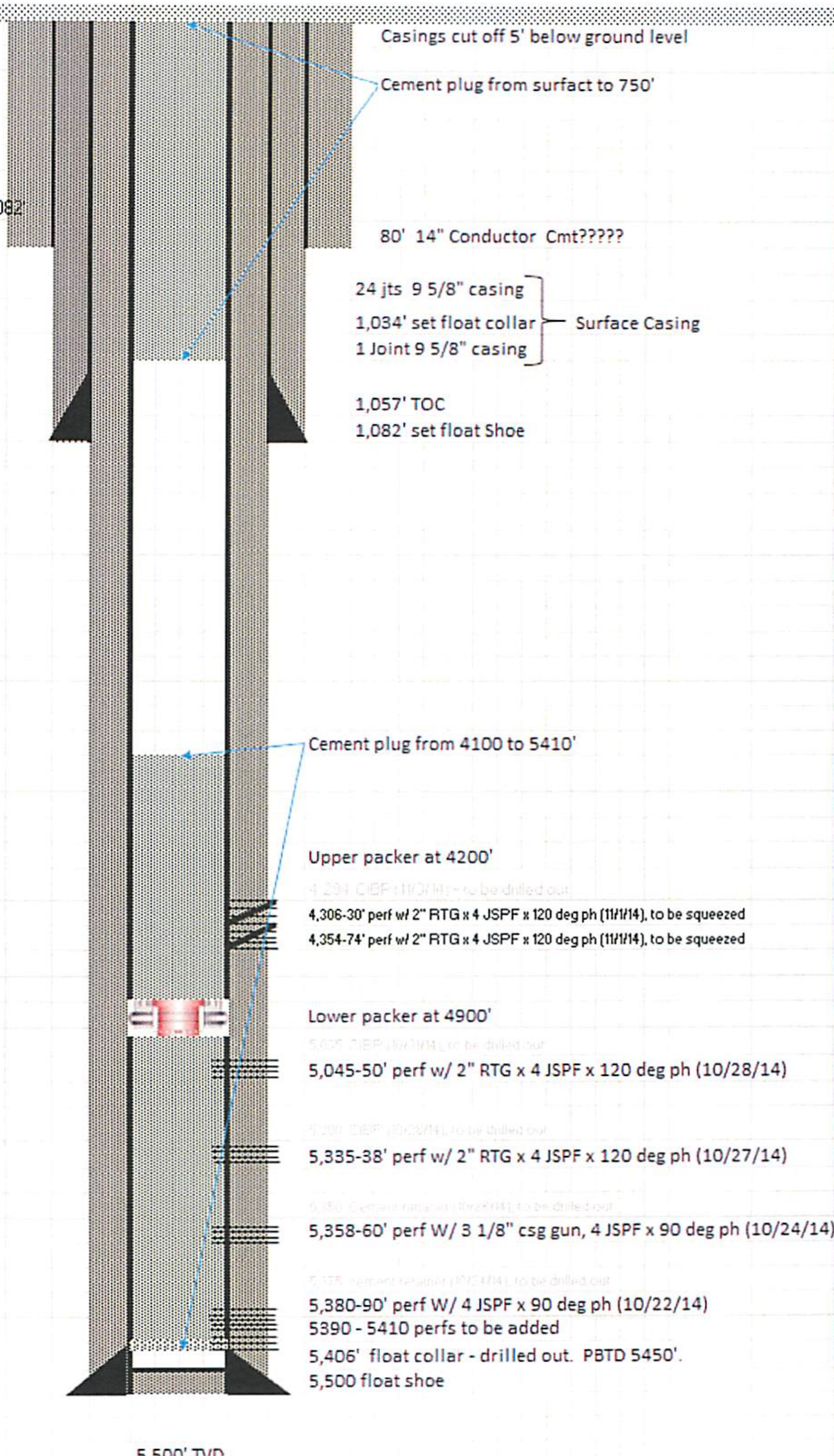
Alta Mesa Holdings **DJS Properties 2-14**

Willow Field - Payett County, ID

Proposed post-injection plugging configuration

Spud 9/12/2014 T&A'd 11/3/2014

GL Elevation above MSL: 2,488'



Casing & Cement

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Pumped 9 cubic yards cement top down surface job.

Well Name & No.: DJS Properties 2-14	Field: Willow
County: Payette	State: Idaho
Total Depth (MD): 5,500'	(TVD) 5,500'
Date Completed: T&A on 11/3/2014	Latest Revision Date: 2/3/2015

OMB No. 2040-0042 Approval Expires 12/31/2018

EPA

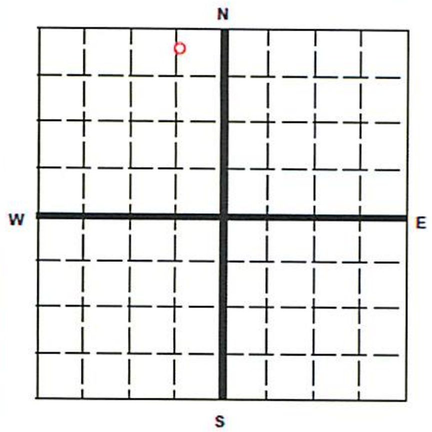
United States Environmental Protection Agency
Washington, DC 20460

PLUGGING AND ABANDONMENT PLAN

Name and Address of Facility
DJS Properties # 2-14

Name and Address of Owner/Operator
Alta Mesa Services, LP, 15021 Katy Fwy, St 400, Houston, TX 77094

Locate Well and Outline Unit on Section Plat - 640 Acres



State	County	Permit Number
Idaho	Payette	LU600120

Surface Location Description
NE 1/4 of NE 1/4 of NE 1/4 of N 1/4 of Section 14 Township 8N Range 4W

Locate well in two directions from nearest lines of quarter section and drilling unit

Surface
Location 95 ft. frm (N/S) N Line of quarter section
and 2315 ft. from (E/W) W Line of quarter section.

TYPE OF AUTHORIZATION
- ☑ Individual Permit
- ☐ Area Permit
- ☐ Rule

Number of Wells 1

Lease Name DJS Properties

WELL ACTIVITY
- ☐ CLASS I
- ☑ CLASS II
  - ☑ Brine Disposal
  - ☐ Enhanced Recovery
  - ☐ Hydrocarbon Storage
- ☐ CLASS III

Well Number 2-14

CASING AND TUBING RECORD AFTER PLUGGING

SIZE	WT (LB/FT)	TO BE PUT IN WELL (FT)	TO BE LEFT IN WELL (FT)	HOLE SIZE
7"	26	5500	5500	8.75"
9.625"	40	1082	1082	12.75
13.375"	61	120	120	17.5"

METHOD OF EMPLACEMENT OF CEMENT PLUGS
- ☑ The Balance Method
- ☐ The Dump Bailer Method
- ☐ The Two-Plug Method
- ☑ Other

CEMENTING TO PLUG AND ABANDON DATA:	PLUG #1	PLUG #2	PLUG #3	PLUG #4	PLUG #5	PLUG #6	PLUG #7
Size of Hole or Pipe in which Plug Will Be Placed (inche	7"	7"					
Depth to Bottom of Tubing or Drill Pipe (ft	5410	750					
Sacks of Cement To Be Used (each plug)	TBD	TBD					
Slurry Volume To Be Pumped (cu. ft.)	282	162					
Calculated Top of Plug (ft.)	4100	0					
Measured Top of Plug (if tagged ft.)	N/A - future	N/A - future					
Slurry Wt. (Lb./Gal.)	TBD	TBD					
Type Cement or Other Material (Class III)	TBD	TBD					

LIST ALL OPEN HOLE AND/OR PERFORATED INTERVALS AND INTERVALS WHERE CASING WILL BE VARIED (if any)

From	To	From	To
4306	4330 (existing perfs)	5380	5390 (existing perfs)
4354	4374 (existing perfs)	5390	5410 (to be added for injection)
5045	5050 (existing perfs)		
5335	5360 (existing perfs)		

Estimated Cost to Plug Wells
TBD - cement type, volumes, density and type to be determined based on regulatory requirements and products in existence at time of plugging.

Certification

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possiblity of fine and imprisonment. (Ref. 40 CFR 144.32)

Name and Official Title *(Please type or print)*	Signature	Date Signed

EPA Form 7520-14 (Rev. 12-11)

ATTACHMENT R

R. NECESSARY RESOURCES

This bond replaces and supersedes Aspen American Insurance Co Bond No. SU46286 effective March 28, 2016.

IDAHO DEPARTMENT OF LANDS

IDAHO OIL AND GAS CONSERVATION COMMISSION

BOND

Bond No. 1138356

Known all men by these presents, that we: Alta Mesa Services, LP of the County of Harris in the state of: Texas as principal, and Lexon Insurance Company of 10002 Shelbyville Rd. Suite 100, Louisville, KY 40223 as surety, authorized to do business in this State, are held and firmly bound unto the State in the penal sum as indicated, lawful money of the United States, for which payment, well and truly to be make, we bind ourselves, and each of us, and each of our heirs, executors, administrators or successors, and assigns jointly and severally, firmly by these presents.

The condition of this obligation is that whereas the above bounden principal proposes to drill a well or wells for oil, gas, or stratigraphic purposes in and upon the following described land situated within the State, to wit: *(May be used for blanket bond or for single well)*

See attached Exhibit "A"

NOW, THEREFORE, if the above bounden principal shall comply with all of the provisions of the laws of the State and the rules, regulations and orders of the Conservation Commission of the State, especially with reference to the proper plugging of said well or wells, and filing with the Oil and Gas Conservation commission of this State all notices and records required by said Commission, in the event said well or wells do not produce oil or gas in commercial quantities, or cease to produce oil or gas in commercial quantities, then this obligation is void; otherwise, the same shall be and remain in full force and effect.

Penal Sum of One Hundred Thousand and No/100 ($100,000.00)

Witness our hands and seals, this 28th day of March, 2016

Principal: Alta Mesa Services, LP

Principal: [signature]
Michael A. McCabe, CFO

Witness our hands and seals, this 28th day of March, 2016.

Surety (print): Lexon Insurance Company

Surety(signature): [signature]
Teresa D. Kelly, Attorney-in-Fact

(If the principal is a corporation, the bond should be executed by its duly authorized officers, with the seal of the corporation affixed. When principal or surety executes this bond by agent, power of attorney or other evidence of authority must accompany the bond.)

Idaho Oil and Gas Conservation Commission

Approval Date: ____________ ______________________
Secretary

POA #LX-264759

Form No. P-2

This bond replaces and supersedes Aspen American Insurance Company Bond No. SU46311 effective March 28, 2016.

IDAHO DEPARTMENT OF LANDS

State of Idaho
DEPARTMENT OF LANDS

Surety Bond Number 1136357

Lease/Plan/Permit No(s). See Attached Exhibit "A"

KNOW ALL MEN BY THESE PRESENTS, That we AM Idaho LLC, as principal and Lexon Insurance Company, a corporation organized under the laws of the State of Texas, and having its principal place of business in the State of Kentucky, in the City of Louisville, as surety are held and firmly bound unto the State of Idaho, in the sum of One Hundred Thousand------ dollars ($ 100,000.00) lawful money of the United States, conditioned on the payment of all damages to the surface and improvements thereon of lands described in the above lease/plan/permit specified and any outstanding balances as set forth in the lease/plan/permit. For such payment, well and truly to be made, we bind ourselves, our and each of our heirs, executors, administrators, successors and assignees, as the case may be, jointly and severally, firmly by these presents.

THE CONDITION of the foregoing obligation is such that:

WHEREAS, by lease/plan/permit bearing the above serial number, the lessee/plan holder/permittee was granted specific rights under and pursuant to Idaho Code title 58, chapters 1,3 and 6 or Idaho Code title 47, chapters 7, 8, 13, 15 or 16, and the pertinent rules and regulations of the Idaho State Board of Land Commissioners; and

WHEREAS, said lessee/plan holder/permittee has, by virtue of the lease/plan/permit above referred to, entered into certain covenants and agreements set forth in such lease/plan/permit, under which operations are to be conducted; and

WHEREAS, the said principal, in consideration of being permitted, in lieu of the lessee/plan holder/permittee, to furnish this bond agrees and by these presents does hereby bond himself to fulfill on behalf of the lessee/plan holder/permittee all of the obligations of the said lease/plan/permit in the same manner and to the same extent as though he were the lessee/plan holder/permittee. It is understood and agreed by the surety and the principal that if there is outstanding restoration obligations on the premises, or if outstanding payments are due, this bond shall extend to cover all acts for which restoration is required or payment of such outstanding amounts due, both prior to and subsequent to the date of this bond, until notified in writing by the Idaho Department of Lands that such requirements have been met or the bond has been replaced. The Idaho Department of Lands may require payment of the entire sum of this bond, or portions thereof, upon written notice to the surety, by the department, of the lessee/plan holder/permittee's failure to perform any obligations and/or pay any amounts due under the above referenced statutes and pertinent rules.

The surety shall pay to the Department of Lands the sum of this bond, or portions thereof, as requested by the department within 30 days of receipt of such written notice. In the event of a partial distribution, the remaining funds and liabilities shall not be released until the department notifies the surety, in writing, of release of remaining liability or requires payment of the remaining bond liabilities. Payment of the full sum of the bond to the department shall release the surety of all liabilities and obligations.

NOW THEREFORE, if the above principal shall in good faith observe, carry out and comply with all the laws now existing or hereafter enacted, designed or intended for the protection of the surface owner of said lands against damage and resulting loss caused by any operations carried on under said lease/plan/permit, or if any such damage and resulting loss shall so occur nevertheless, for which damage and loss reimbursement is required and made, then this obligation shall become void, otherwise to remain in full force and effect, and the liability of the surety under this bond for any one or more defaults of the principal under said lease/plan/permit shall not exceed in the aggregate the sum stated herein above. It is further provided, however, that the bond may be cancelled by the surety by the service of written notice of cancellation upon the Director of the Department of Lands of the State of Idaho, such cancellation to be effective at the expiration of ninety (90) days after the service of such cancellation notice by the surety on the Director by registered mail. Such cancellation notice, however, shall not affect any liability that shall have accrued under this bond prior to the effective date of cancellation.

Signed on this 28th day of March, 2016

(Signature of Principal) Michael A. McCabe, CFO
15021 Katy Frwy, Suite 400, Houston, TX 77094
(Business Address)

(Signature of Surety) Teresa D. Kelly, Attorney-in-Fact
10002 Shelbyville Rd. Suite 100, Louisville, KY 40223
(Business Address)

ACKNOWLEDGEMENT OF SURETY

State of Texas)
) ss
County of Harris)

On this 28th day of March, in the year 2016, before me Candace D. Bosheers, a Notary Public in and for the State of Texas, personally appeared Teresa D. Kelly, known to me to be the attorney-in-fact of the corporation that executed the instrument, or the person who executed the instrument on behalf of said corporation, and acknowledged to me that such corporation executed the same.

In Witness Whereof, I have hereunto set my hand and affixed my official seal of day and year first above written.

Notary Public For Harris County, Texas
Residing at: 5444 Westheimer, Suite 900, Houston, TX 77056
My Commission expires January 24, 20 20

POA #LX-264760

IDL 1801-29(26) 5-1-2002

ATTACHMENT S

S. **AQUIFER EXEMPTION FOR INJECTION ZONE** – See next three (3) pages for water analysis of the water produced from perforations at 5380 – 5390, which characterizes the water in the proposed injection zone. The depth of this zone, along with the presence of Benzene and other volatile organic compounds would limit or prevent the use of the water in this zone for aquifer uses.

Analytical Laboratories, Inc.
1804 N. 33rd Street
Boise, Idaho 83703
Phone (208) 342-5515

Attn: JEFF JANIK
ALTA MESA SERVICES, LP
15021 KATY FREEWAY STE 400
HOUSTON, TX 77094

Collected By: J JANIK
Submitted By: J JANIK

Perfs 5380 - 5390'

Source of Sample:
DJS PROP 2-14 PRODUCOD WATER

Time of Collection: 16:00
Date of Collection: 10/22/2014
Date Received: 10/23/2014
Report Date: 11/7/2014

Field Temp:
PWS:

Temp Revd in Lab: 20.4 °C
PWS Name

Laboratory Analysis Report

Sample Number: 1442245

NO FIELD TEMP GIVEN; NO TRAVEL BLANKS RCVD; Methane, Ethane, and Ethene testing were performed by Accutest Mountain States (AMS).

Test Requested	MCL	Analysis Result	Units	MDL	Method	Date Completed	Analyst
Aluminum, Al	UR	1.12	mg/L	0.10	EPA 200.7	10/24/2014	KC
Arsenic Low	0.01	< 0.005	mg/L	0.005	EPA 200.8	11/3/2014	JH
Barium, Ba	2	0.12	mg/L	0.05	EPA 200.7	10/24/2014	KC
Boron, B		7.40	mg/L	0.10	EPA 200.7	11/4/2014	KC
Calcium, Ca	UR	51.1	mg/L	0.50	EPA 200.7	10/28/2014	KC
Iron, Fe	UR	11.9	mg/L	0	EPA 200.7	10/29/2014	KC
Magnesium, Mg	UR	0.50	mg/L	0.50	EPA 200.7	10/28/2014	KC
Manganese Low		0.128	mg/L	0.005	EPA 200.7	10/24/2014	KC
Potassium, K	UR	56.7	mg/L	0.5	EPA 200.7	10/28/2014	KC
Selenium Low	0.05	< 0.005	mg/L	0.005	EPA 200.8	11/3/2014	JH
Silica	UR	106	mg/L	0.25	EPA 200.7	11/4/2014	KC
Sodium, Na	UR	392	mg/L	0.50	EPA 200.7	10/28/2014	KC
Uranium, U	30	< 5	ug/L	5	EPA 200.8	11/3/2014	JH
Metals Digestion		*			EPA 200.9-11	10/23/2014	JMS
Density		0.998	g/mL		Gravimetric	11/4/2014	JH
Nitrate (as N)		< 0.2	mg/L	0.2	EPA 300.0	10/23/2014	NC

MCL – Maximum Contamination Level
MDL – Method/Minimum Detection Limit
UR – Unregulated

Date Report Printed: 11/7/2014 11:59:12

Laboratory Analysis Report

Sample Number: 1442245

NO FIELD TEMP GIVEN; NO TRAVEL BLANKS RCVD; Methane, Ethane, and Ethene testing were performed by Accutest Mountain States (AMS).

Test Requested	MCL	Analysis Result	Units	MDL	Method	Date Completed	Analyst
Benzene		1510	ug/L	0.5	EPA 8260B	10/28/2014	CY
Toluene		830	ug/L	0.5	EPA 8260B	10/28/2014	CY
Ethylbenzene		55.0	ug/L	0.5	EPA 8260B	10/28/2014	CY
Xylene, Total		390	ug/L	0.5	EPA 8260B	10/28/2014	CY
Methane		2.49	mg/L	0.0008	RSKSOP 175	10/27/2014	AMS
Ethane		0.399	mg/L	0.0016	RSKSOP 175	10/27/2014	AMS
Ethene		<0.0024	mg/L	0.0024	RSKSOP 175	10/27/2014	AMS
Alkalinity	UR	332	mg/L CaCO3		EPA 310.1	10/30/2014	CJS
Chloride, Cl	UR	305	mg/L	1	EPA 300.0	10/23/2014	NC
Fluoride, F	4.0	6.88	mg/L	0.10	EPA 300.0	10/23/2014	NC
Sulfate, SO4	UR	34	mg/L	1	EPA 300.0	10/23/2014	NC
pH	UR	8.8	S.U.		SM 4500-H B	10/23/2014	RME
Conductivity	UR	1,880	umhos	2	SM 2510B	10/23/2014	RME
Bicarbonate		302	mg/L		SM 2320	10/30/2014	CJS
Carbonate		29.8	mg/L		SM 2320	10/30/2014	CJS
Hydroxide		0.0	mg/L		SM 2320	10/30/2014	CJS
Resistivity		5.32	ohm*cm			10/23/2014	DS
Total Dissolved Solids	UR	1,540	mg/L	25	SM 2540C	10/28/2014	GM

MCL = Maximum Contamination Level
MDL = Method/Minimum Detection Limit
UR = Unregulated

Thank you for choosing Analytical Laboratories for your testing needs.
If you have any questions concerning this report,
please contact your client manager: James Hibbs

Page 2 of 2

Date Report Printed: 11/7/2014 11:59:12

Analytical Laboratories, Inc.
1804 N. 33rd Street
Boise, Idaho 83703
Phone (208) 342-5515

Date Report Printed 11/21/2014 3:49:55 PM
http://www.analyticallaboratories.com
These test results relate only to the items tested.

Laboratory Analysis Report

Sample Number: 1442246

Attn: JEFF JANIK
ALTA MESA SERVICES, LP
15021 KATY FREEWAY STE 400
HOUSTON, TX 77094

Collected By: J JANIK
Submitted By: J JANIK

Source of Sample:
DJS PROP 2-14 PRODUCOD WATER

Time of Collection: 16:00
Date of Collection: 10/22/2014
Date Received: 10/23/2014
Report Date: 11/21/2014

PWS#:
PWS Name:

Field Temp: Temp Rcvd in Lab 20.4 °C

NO FIELD TEMP GIVEN; Radiological testing was performed by Summit Environmental (SUM).

Test Requested	MCL	Analysis Result	Units	MDL	Method	Date Completed	Analyst
Gross Alpha	15 pCi	<3	pCi/L	3	EPA 900.0	11/11/2014	SUM
Gross Beta		57+/-5.8	pCi/L	4	EPA 900.0	11/11/2014	SUM

MCL – Maximum Contamination Level
MDL – Method/Minimum Detection Limit
UR – Unregulated

Page 1 of 1

Thank you for choosing Analytical Laboratories for your testing needs.
If you have any questions about this report, or any future analytical needs, please contact your client manager.
James Hibbs

ATTACHMENT U

U. **DESCRIPTION OF BUSINESS** - Alta Mesa Services, LP is the operating subsidiary of Alta Mesa Holdings, LP. Alta Mesa Holdings, LP is a privately-held, independent exploration and production company, primarily engaged in the acquisition, exploration, development and production of oil, natural gas and natural gas liquids within the United States.

Checklist for Idaho Presentation:

-PowerPoint

-Background information on the history of SPA revisions (when did EPA first ask the state to make revisions? When did EPA and IDWR decide to work together to address?)

-Background information on inadequacies (enforcement requirements, mine-tailing backfill, groundwater quality values)

-Determination on whether EPA can begin reviewing permits submitted before EPA has primacy

-Materials for permit application submitted?

Anatek Labs, Inc.

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504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client:	HOLLADAY ENGINEERING CO	**Batch #:**	170315039
Address:	32 NORTH MAIN ST PAYETTE, ID 83661	**Project Name:**	CHARACTERIZE WELL PRODUCTION WATER PC16-0336A
Attn:	BASIL TUPYI		

Analytical Results Report

Sample Number	170315039-001	**Sampling Date**	3/13/2017	**Date/Time Received**	3/15/2017 12:45 PM
Client Sample ID	WP4-1	**Sampling Time**	2:30 PM		
Matrix	Water				
Comments					

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Alkalinity	525	mg CaCO3/L	5	3/24/2017	KMC	SM2320B	
Arsenic	ND	mg/L	0.02	3/27/2017	HSW	EPA 200.8	
Barium	0.315	mg/L	0.02	3/27/2017	HSW	EPA 200.8	
BOD	>38.0	mg/L	2	3/20/2017	KMC	SM5210B	K3,K2
Boron	7.61	mg/L	0.2	3/27/2017	HSW	EPA 200.8	
Cadmium	ND	mg/L	0.02	3/27/2017	HSW	EPA 200.8	
Calcium	70.7	mg/L	1	3/17/2017	SRN	EPA 200.7	
Chloride	874	mg/L	10	4/11/2017 5:36:00 PM	MER	EPA 300.0	
Chromium	ND	mg/L	0.02	3/27/2017	HSW	EPA 200.8	
COD	277	mg/L	15	3/17/2017 4:30:00 PM	KAE	EPA 410.4	
Conductivity	4320	µmhos/cm	10	3/20/2017	KMC	SM2510B	
Copper	ND	mg/L	0.02	3/27/2017	HSW	EPA 200.8	
Cyanide	0.0131	mg/L	0.01	3/23/2017	MER	EPA 335.4	
Fluoride	1.89	mg/L	1	3/15/2017 11:14:00 PM	MER	EPA 300.0	
Hexane extractable material (HEM)	7.2	mg/L	1	3/29/2017	RPR	EPA 1664A	
Gross Alpha	0.120 ± 5.49	pCi/L	10.1	3/27/2017	GPB	EPA 900.0	D9
Gross Beta	592 ± 31.8	pCi/L	6.92	3/27/2017	GPB	EPA 900.0	
Iron	2.54	mg/L	0.2	3/17/2017	SRN	EPA 200.7	
Lead	ND	mg/L	0.02	3/27/2017	HSW	EPA 200.8	
Magnesium	ND	mg/L	1	3/17/2017	SRN	EPA 200.7	
Manganese	0.240	mg/L	0.1	3/17/2017	SRN	EPA 200.7	
Mercury-CVAFS	4.31	ug/L	0.1	3/30/2017	ETL	EPA 245.7	
NO3/N	0.477	mg/L	0.1	3/15/2017 11:35:00 PM	MER	EPA 300.0	
NO2/N	ND	mg/L	0.1	3/15/2017 11:35:00 PM	MER	EPA 300.0	
Potassium	558	mg/L	1	3/17/2017	SRN	EPA 200.7	
Barium Carrier	93.7	%		3/20/2017	SRN	EPA 903.0	
Radium 226	0.516 ± 0.292	pCi/L	0.189	3/20/2017	SRN	EPA 903.0	
Barium Carrier	95.0	%		3/21/2017	SRN	EPA 904.0	
Radium 228	0.972 ± 0.220	pCi/L	0.204	3/21/2017	SRN	EPA 904.0	
Selenium	ND	mg/L	0.02	3/27/2017	HSW	EPA 200.8	
Silica (as SiO2)	50.9	mg/L	1	3/17/2017	SRN	EPA 200.7	
Silicon	23.8	mg/L	1	3/17/2017	SRN	EPA 200.7	
Silver	ND	mg/L	0.02	3/27/2017	HSW	EPA 200.8	
Sodium	404	mg/L	1	3/17/2017	SRN	EPA 200.7	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013;NV:ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

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Client:	HOLLADAY ENGINEERING CO	**Batch #:**	170315039
Address:	32 NORTH MAIN ST PAYETTE, ID 83661	**Project Name:**	CHARACTERIZE WELL PRODUCTION WATER PC16-0336A
Attn:	BASIL TUPYI		

Analytical Results Report

Sample Number	170315039-001	**Sampling Date**	3/13/2017	**Date/Time Received**	3/15/2017 12:45 PM
Client Sample ID	WP4-1	**Sampling Time**	2:30 PM		
Matrix	Water				
Comments					

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
TDS	2910	mg/L	50	3/15/2017	KMC	SM 2540C	
TSS	12.4	mg/L	1	3/20/2017	KMC	SM 2540D	
Strontium	2.15	mg/L	0.2	3/27/2017	HSW	EPA 200.8	
Sulfate	47.3	mg/L	1	3/15/2017 11:14:00 PM	MER	EPA 300.0	
MBAS	0.137	mg/L 342.4MW LAS	0.05	4/5/2017	KMC	SM5540C	
Titanium	ND	mg/L	0.02	3/27/2017	HSW	EPA 200.8	
Turbidity	9.66	NTU	0.1	3/20/2017	KMC	EPA 180.1	

Authorized Signature

Todd Taruscio, Lab Manager

D9	MDA adjusted due to sample dilution; analyte was non-detect in the sample
K2	The sample dilutions set up for the BOD analysis did not meet the criteria of a residual dissolved oxygen of at least 1 mg/L. Any reported result is an estimated value.
K3	The dilution water D.O. depletion was >0.2 mg/L
MCL	EPA's Maximum Contaminant Level
ND	Not Detected
PQL	Practical Quantitation Limit

The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013;NV:ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

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Login Report

Customer Name: HOLLADAY ENGINEERING CO
32 NORTH MAIN ST
PAYETTE ID 83661

Order ID: 170315039
Order Date: 3/15/2017

Contact Name: BASIL TUPYI

Project Name: CHARACTERIZE WELL PRODUCTION WATER PC16-0336A

Comment:

Sample #: 170315039-001 **Customer Sample #:** WP4-1

Recv'd: ☑ **Matrix:** Water **Collector:** BASIL TUPYI **Date Collected:** 3/13/2017
Quantity: 9 **Date Received:** 3/15/2017 12:45:00 PM **Time Collected:** 2:30 PM
Comment:

Test	Lab	Method	Due Date	Priority
ALKALINITY	M	SM2320B	3/27/2017	***Normal (~10 Days)***
ARSENIC	M	EPA 200.8	3/27/2017	***Normal (~10 Days)***
BARIUM	M	EPA 200.8	3/27/2017	***Normal (~10 Days)***
BOD	M	SM5210B	3/27/2017	***Normal (~10 Days)***
BORON	M	EPA 200.8	3/27/2017	***Normal (~10 Days)***
CADMIUM	M	EPA 200.8	3/27/2017	***Normal (~10 Days)***
CALCIUM ICP	M	EPA 200.7	3/27/2017	***Normal (~10 Days)***
CHLORIDE	M	EPA 300.0	3/27/2017	***Normal (~10 Days)***
CHROMIUM	M	EPA 200.8	3/27/2017	***Normal (~10 Days)***
COD - CHEMICAL OXYGEN DEMAND	S	EPA 410.4	3/27/2017	***Normal (~10 Days)***
CONDUCTIVITY	M	SM2510B	3/27/2017	***Normal (~10 Days)***
COPPER	M	EPA 200.8	3/27/2017	***Normal (~10 Days)***
CYANIDE TOTAL EPA	M	EPA 335.4	3/27/2017	***Normal (~10 Days)***
FLUORIDE	M	EPA 300.0	3/27/2017	***Normal (~10 Days)***
FOG - HEM	M	EPA 1664A	3/27/2017	***Normal (~10 Days)***
GROSS ALPHA MOSC	M	EPA 900.0	3/27/2017	***Normal (~10 Days)***
GROSS BETA MOSC	M	EPA 900.0	3/27/2017	***Normal (~10 Days)***
IRON ICP	M	EPA 200.7	3/27/2017	***Normal (~10 Days)***
LEAD	M	EPA 200.8	3/27/2017	***Normal (~10 Days)***
MAGNESIUM ICP	M	EPA 200.7	3/27/2017	***Normal (~10 Days)***
MANGANESE ICP	M	EPA 200.7	3/27/2017	***Normal (~10 Days)***
MERCURY-CVAFS	M	EPA 245.7	3/27/2017	***Normal (~10 Days)***
NITRATE/N	M	EPA 300.0	3/27/2017	***Normal (~10 Days)***

Customer Name: HOLLADAY ENGINEERING CO
32 NORTH MAIN ST
PAYETTE ID 83661

Order ID: 170315039
Order Date: 3/15/2017

Contact Name: BASIL TUPYI

Project Name: CHARACTERIZE WELL PRODUCTION WATER PC16-0336A

Comment:

NITRITE/N	M	EPA 300.0	3/27/2017	***Normal (~10 Days)***
POTASSIUM ICP	M	EPA 200.7	3/27/2017	***Normal (~10 Days)***
RADIUM 226 MOSC	M	EPA 903.0	3/27/2017	***Normal (~10 Days)***
RADIUM 228 MOSC	M	EPA 904.0	3/27/2017	***Normal (~10 Days)***
SELENIUM	M	EPA 200.8	3/27/2017	***Normal (~10 Days)***
SILICON ICP	M	EPA 200.7	3/27/2017	***Normal (~10 Days)***
SILVER	M	EPA 200.8	3/27/2017	***Normal (~10 Days)***
SODIUM ICP	M	EPA 200.7	3/27/2017	***Normal (~10 Days)***
SOLIDS - TDS	M	SM 2540C	3/27/2017	***Normal (~10 Days)***
SOLIDS - TSS	M	SM 2540D	3/27/2017	***Normal (~10 Days)***
STRONTIUM	M	EPA 200.8	3/27/2017	***Normal (~10 Days)***
SULFATE	M	EPA 300.0	3/27/2017	***Normal (~10 Days)***
SURFACTANTS	M	SM5540C	3/27/2017	***Normal (~10 Days)***
TITANIUM	M	EPA 200.8	3/27/2017	***Normal (~10 Days)***
TURBIDITY	M	EPA 180.1	3/27/2017	***Normal (~10 Days)***

SAMPLE CONDITION RECORD

Samples received in a cooler?	Yes
Samples received intact?	Yes
What is the temperature of the sample(s)? (°C)	7.9
Samples received with a COC?	Yes
Samples received within holding time?	Yes
Are all sample bottles properly preserved?	Yes
Are VOC samples free of headspace?	N/A
Is there a trip blank to accompany VOC samples?	N/A
Labels and chain agree?	Yes

170315 039 **HDEC** Last Due 3/27/2017
1st SAMP 3/13/2017 1st RCVD 3/15/2017

CHARACTERIZE WELL
PRODUCTION WATER PC16-0336A

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Chain of Custody Record

Company Name: HOLLADAY ENGINEERING
Address: P.O. BOX 235
City: PAYETTE State: IDAHO Zip: 83661
Phone: 208 642 3304
Fax:

Project Manager: BASIL TUPYI
Project Name & #: CHARACTERIZE WELL PRODUCTION WATER PC16-0336A
Email Address: basil@holladayengineering.com
Purchase Order #:
Sampler Name & phone: BASIL TUPYI 208 642-3304

Turn Around Time & Reporting

Please refer to our normal turn around times at: http://www.anateklabs.com/services/guidelines/reporting.asp

X Normal
__Next Day*
__2nd Day*
__Other*____

*All rush order requests must be prior approved.

__Phone
__Mail
__Fax
__Email

Provide Sample Description / List Analyses Requested

Lab ID	Sample Identification	Sampling Date/Time	Matrix	# of Containers	Sample Volume	BOD/TSS	COD	INORGANICS	METALS	CYANIDE	GROSS ALPHA-BETA	RADIUM 226	RADIUM 228	F.O.G.	MBAS
Preservative:							/				/		/	/	
	WP 4-1	2017 13MAR 1130	WATER	9		X	X	X	X	X	X	X	X	X	X
	~~WP 5~~														

Note Special Instructions/Comments

SEE ATTACHED LIST FOR ANALYTICAL PARAMETERS

COOLER 1 MWBS
COD → SPOA
Hg-WAFS poured off from FOG -TK
Notified Basil via email of sample temp & BOD holding time -TK 3/15/17

	Printed Name	Signature	Company	Date	Time
Relinquished by	BASIL TUPYI	Basil Tupyi	Holladay Engineering	14 MAR	530 Am.
Received by	L Heath	L Heath	Anatek	3-15-17	1245
Relinquished by					
Received by					
Relinquished by					
Received by					

Inspection Checklist

Received Intact? Y N
Labels & Chains Agree? Y N 10 bottles
Containers Sealed? Y N
VOC Head Space? Y N
FedEx
Temperature (°C): 7.9 IR-1
Preservative: NaOH, HCL, H2SO4

Date & Time:
Inspected By:

SAMPLES

WP 4-1

Analyte	EPA Method	
[redacted]	[redacted]	
[redacted]	[redacted]	
[redacted]	[redacted]	
[redacted]	[redacted]	
Gross Alpha/Beta	EPA 900.0	
Radium 226	EPA 903.0	
Radium 228	EPA 904.0	
Metals by EPA 200.8/200.7 (As, Ba, Cd, Cr, Cu, Pb, Mg, Mn, Hg, Se, Ag, Ti, Sr, B, Fe, Silica, Ca, Na, K Mg)	EPA 200.8/200.7	
Anions (NO3, NO2, Cl, SO4, F)	EPA 300.0	
Alkalinity	SM2320B	
TDS	EPA 160.1	
TSS	EPA 160.2	
Turbidity	SM2130B	
Conductivity	EPA 120.0	
Surfactants (MBAS)	SM5540C	
Cyanide	SM4500CN-E	
[redacted]	[redacted]	
5-day Biochemical Oxygen Demand	SM 5210	
Chemical Oxygen Demand	SM 5220 or 410.4	
Fats, Oils and Greases (FOG)	EPA 1664	

ALSO
SENECA WW
SAMPLE

COOLER 1

EPA CLASS II INJECTION WELL PERMIT

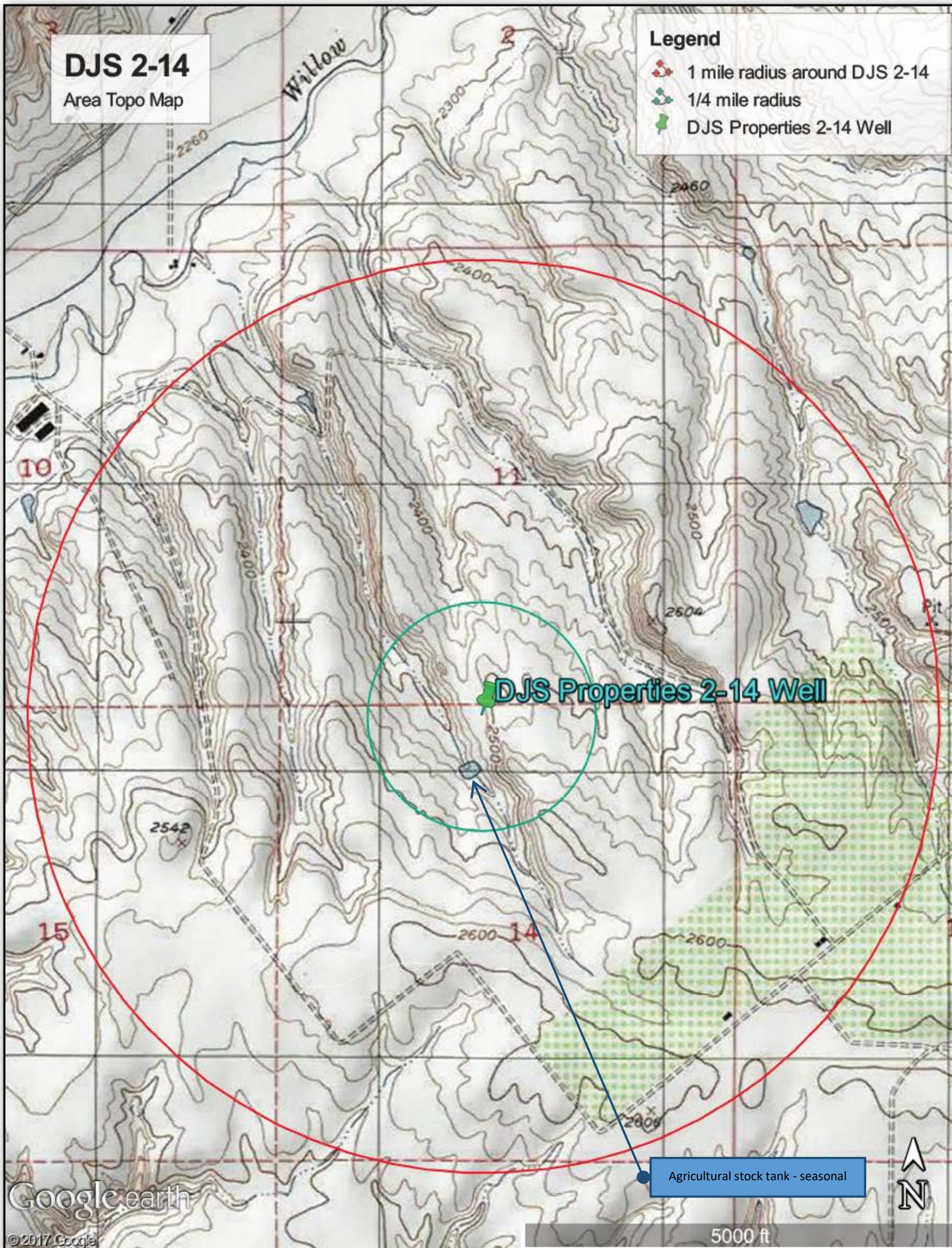
TABLE OF CONTENTS:

ATTACHMENT A

A. **AREA OF REVIEW -** 40 CFR 146.6 requires that the area of review (AOR) for each injection well or each field, project or area of the State be determined per either paragraph (a) or (b) of the regulation. Based on the remote location of the well and the lack of potential pathways which may cause the migration of the injection and/or formation fluid into an underground source of drinking water, Alta Mesa Services, LP has adopted the ¼ mile fixed radius to define the project AOR provided for in the regulations (i.e., 40 CFR 146.6(b)). Specifically, the AOR for this application encompasses a ¼ mile radius circle from the wellbore.

ATTACHMENT B

B. **MAPS OF WELL/AREA AND AREA OF REVIEW -** There are no notable wells, springs, water bodies, etc. within the 0.25 mile radius Area of Review.



-

ATTACHMENT C

C. **CORRECTIVE ACTION PLAN AND WELL DATA -** There are no wells within the area of review.

ATTACHMENT E

E. NAME AND DEPTH OF USDWs (CLASS II) - The Pierce Gulch Aquifer (USDW) is regionally present in the area around the DJS Properties 2-14 Well. In the DJS Properties 2-14, sand is present from the surface to a depth of approximately 250' TVD.

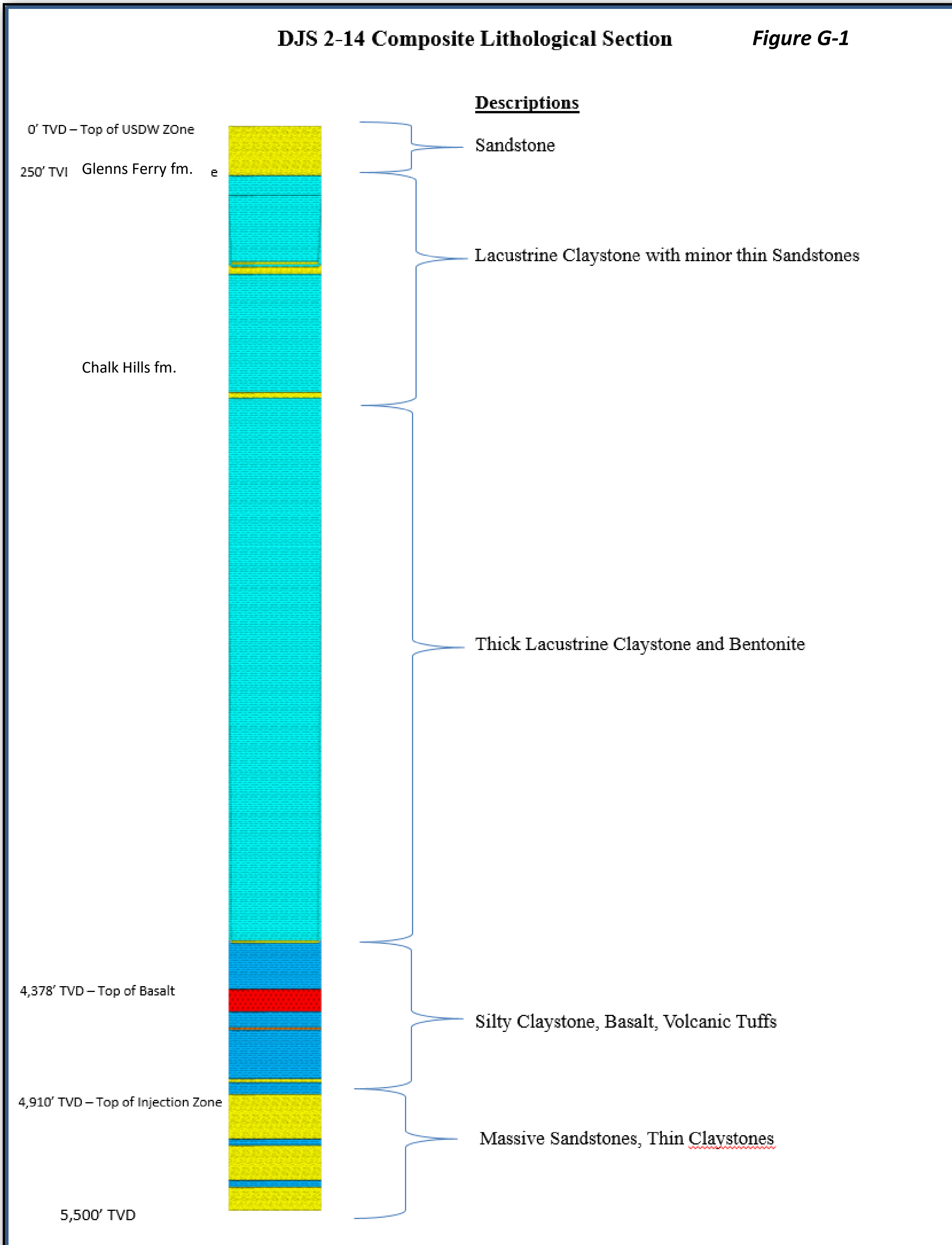
ATTACHMENT G

G. GEOLOGICAL DATA ON INJECTION AND CONFINING ZONES (Class II) - In the Alta Mesa Services, LP DJS Properties 2-14 the proposed injection zone is in a section of the Chalk Hills Formation, composed mainly of permeable quartz rich sandstone (See *Figure G-1* on next page). Per well log correlation the top of the injection zone occurs at 4,910' TVD and is 590' in gross thickness (5,500' Well TD). The confining zone is both the overlying Glenns Ferry Formation and the Chalk Hills formation. These formations are very widely distributed in this basin and are typically very impermeable claystones. (See *Figure G-2* on page 8). In the DJS Properties 2-14 well the Glenns Ferry formation (approx. 250'-1,600' TVD) is composed of highly impermeable lacustrine Claystone, as well as scattered arkosic sandstones. The Chalk Hills formation (approx. 1,600'-4,910' TVD) contains more lacustrine claystone, silicic volcanic ash, and basalt. Per well log correlation the top of the confinement zone is found at 250' TVD and is 4,660' thick. The Pierce Gulch Aquifer is found at the surface and is 250' thick. The Pierce Gulch aquifer is comprised of laminated sandstones interbedded with siltstones and clays.

Geology of the Injection Zone is described *on Figure G-3*, Pages 9-14.

Zone Function	Depth	Thickness	Geologic Name	Lithological Description
USDW Zone:	**Surface – 250' TVD**	**250'**	**Pierce Gulch Aquifer**	**Sandstone, Claystone/Siltstone**
Confining Zones:	**250' TVD**	**1,350'**	**Glenns Ferry Formation**	**Lacustrine Claystone**
	1,600' TVD- 4,910' TVD	**3,310'**	**Chalk Hills Formation**	**Lacustrine, Claystone and Fluvial Sediments, Silicic Volcanic Ash and Basalt**
Injection Zone:	**4,910' TVD to TD 5,510'TVD**	**590'**	**Chalk Hills Formation**	**Quartz Rich Sandstone**

The fracture pressure in the Chalk Hills Formation @5390' has been estimated at 3214 psi, based on a 12 ppg equivalent fluid density A leak off test will be run during the completion procedure to verify the fracture pressure of the confining zone as necessary. Dipole sonic data may become available prior to the completion construction procedure, and will be utilized instead of performing a leak off test to provide the capability to calculate Poisson's ratio and the associate frac gradients in the injection and confining zones. In addition, a step-rate test will be run prior to injection operations to determine actual fracture pressure in the injection zone. Injection operations will be controlled to always provide at least 50 psi below that pressure.


DJS 2-14 Composite Lithological Section
Figure G-1
Descriptions
0' TVD – Top of USDW ZOne
250' TVI
Glenns Ferry fm.
Sandstone
Lacustrine Claystone with minor thin Sandstones
Chalk Hills fm.
Thick Lacustrine Claystone and Bentonite
4,378' TVD – Top of Basalt
Silty Claystone, Basalt, Volcanic Tuffs
4,910' TVD – Top of Injection Zone
Massive Sandstones, Thin Claystones
5,500' TVD

DJS 2-14 Proposed Injection Well – Regional Lacustrine Claystone Seal Map

Figure G-2

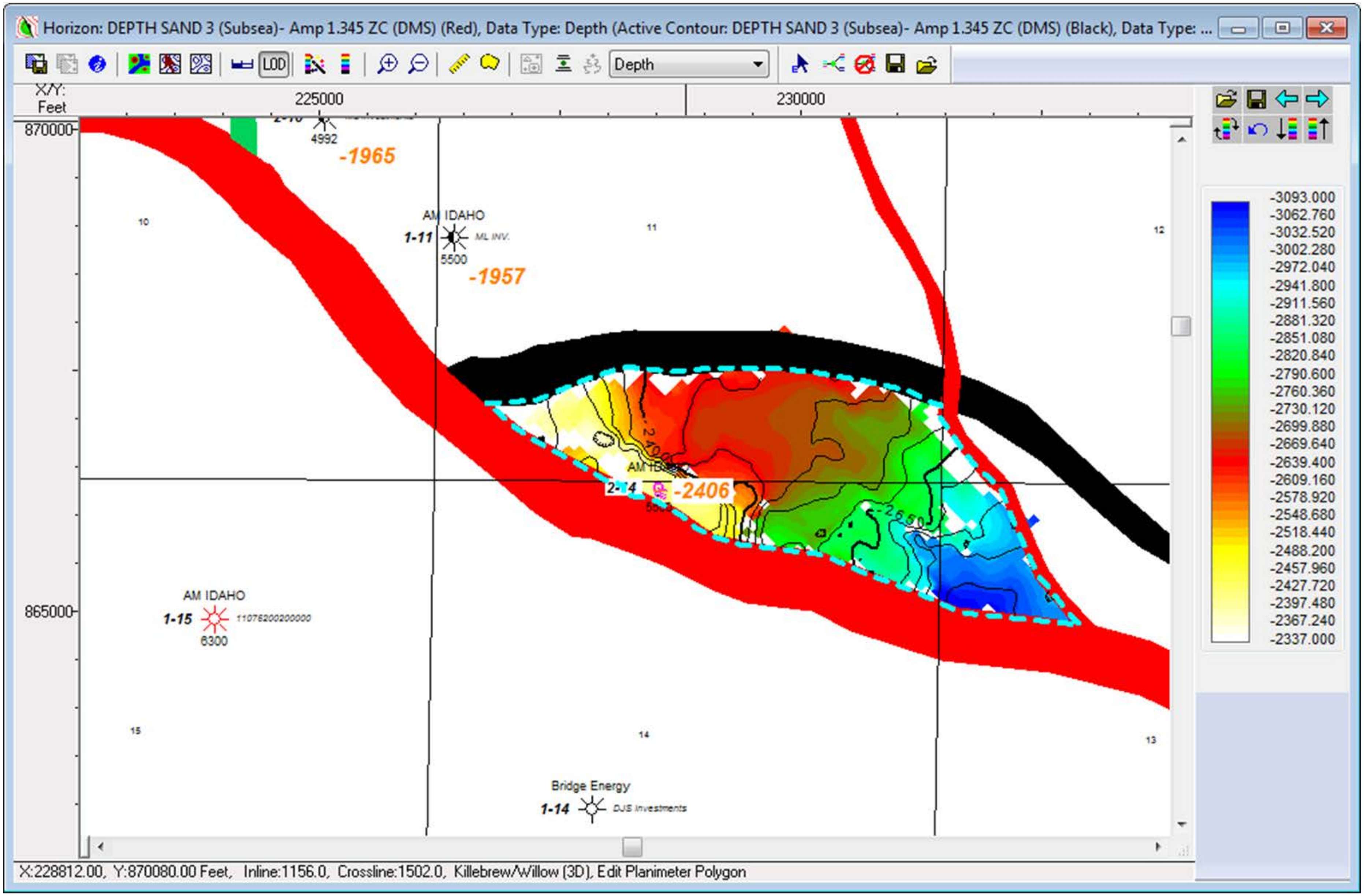
Figure G-3

AM Idaho DJS #2-14 Proposed Disposal Well Geologic Setting

Township: 8 North - Range: 4 West - Section 14
Payette County , Idaho

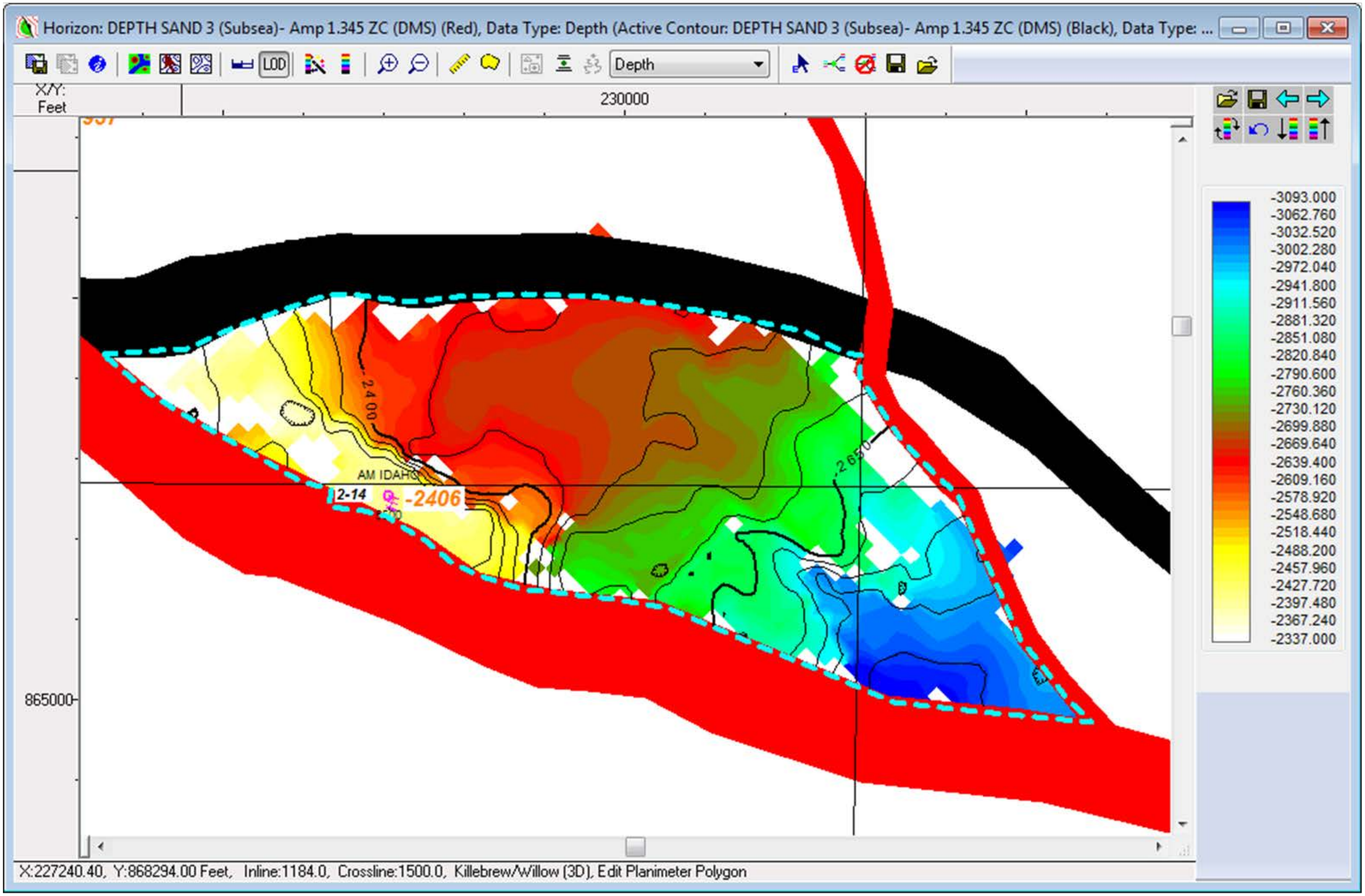
The following structure and Isopach maps were created from interpreting proprietary 3-D seismic data in conjunction with subsurface well control. Subsurface to seismic ties were done by making synthetic seismograms and verifying ties with seismic modelling. Due to the subsurface presence of basalts (very high acoustic impedance), the seismic to subsurface ties are excellent. The quality of the seismic data is very good to excellent, lending strong confidence to the interpretations Presented herein.

Structure Map (subsea): Top Sand 3
Proposed Injection Zone - Scale 1": 1000'



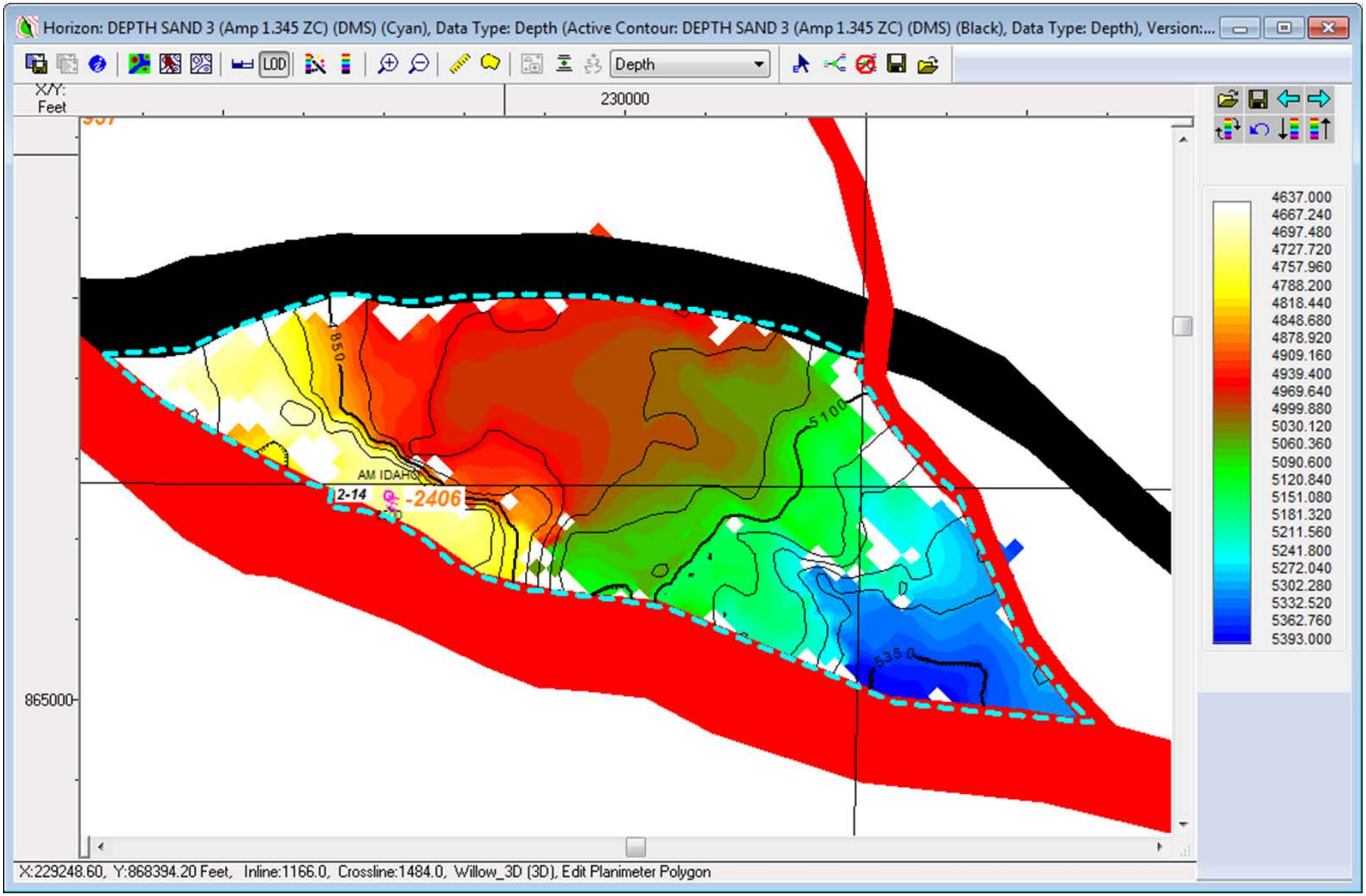
DMS 9/2017

Structure Map (subsea): Top Sand 3
Proposed Injection Zone - Scale 1": 600'



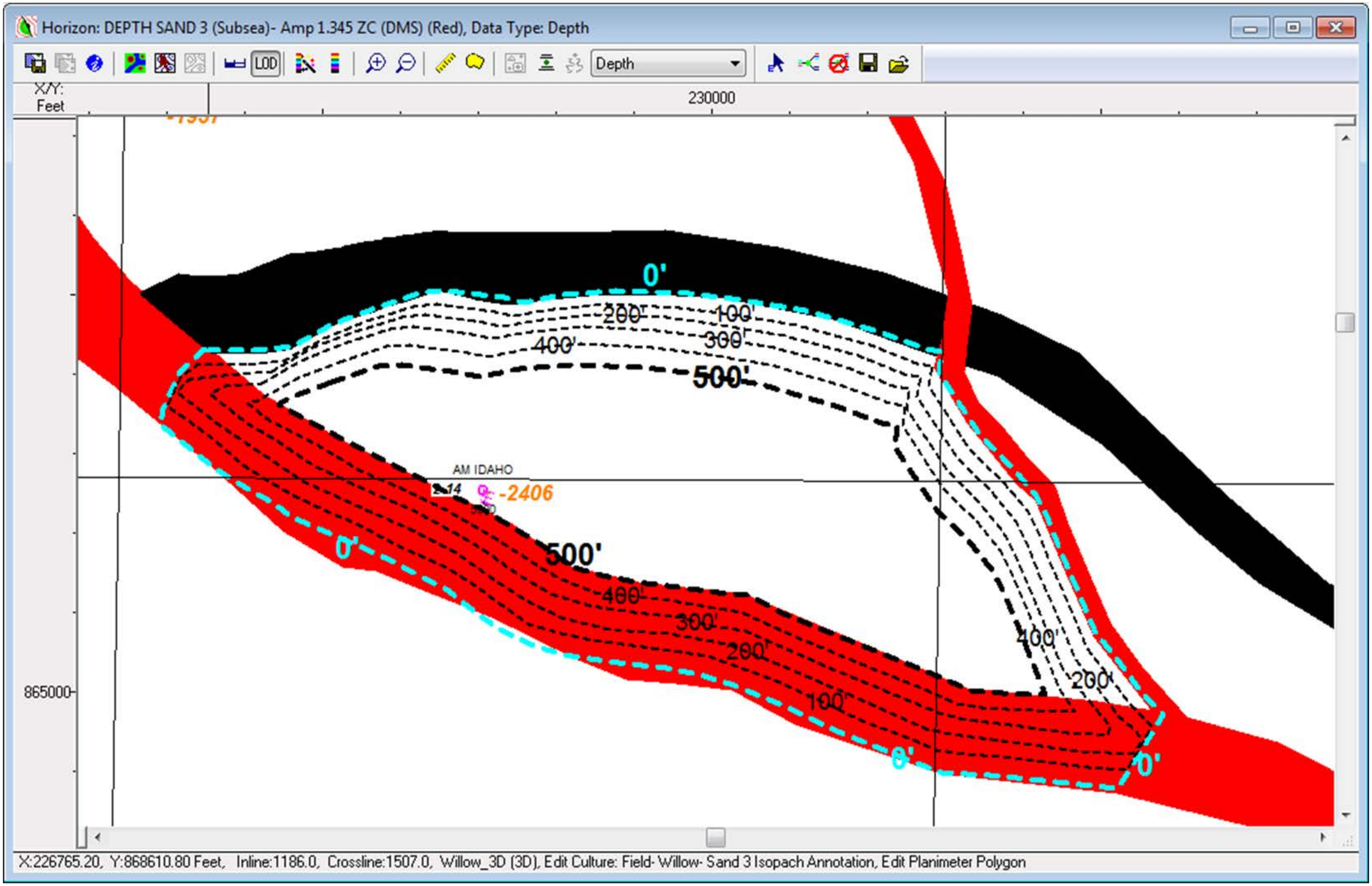
DMS 9/2017

Structure Map (below Ground level datum of 2300' ASL): Top Sand 3 Proposed Injection Zone - Scale 1": 600'



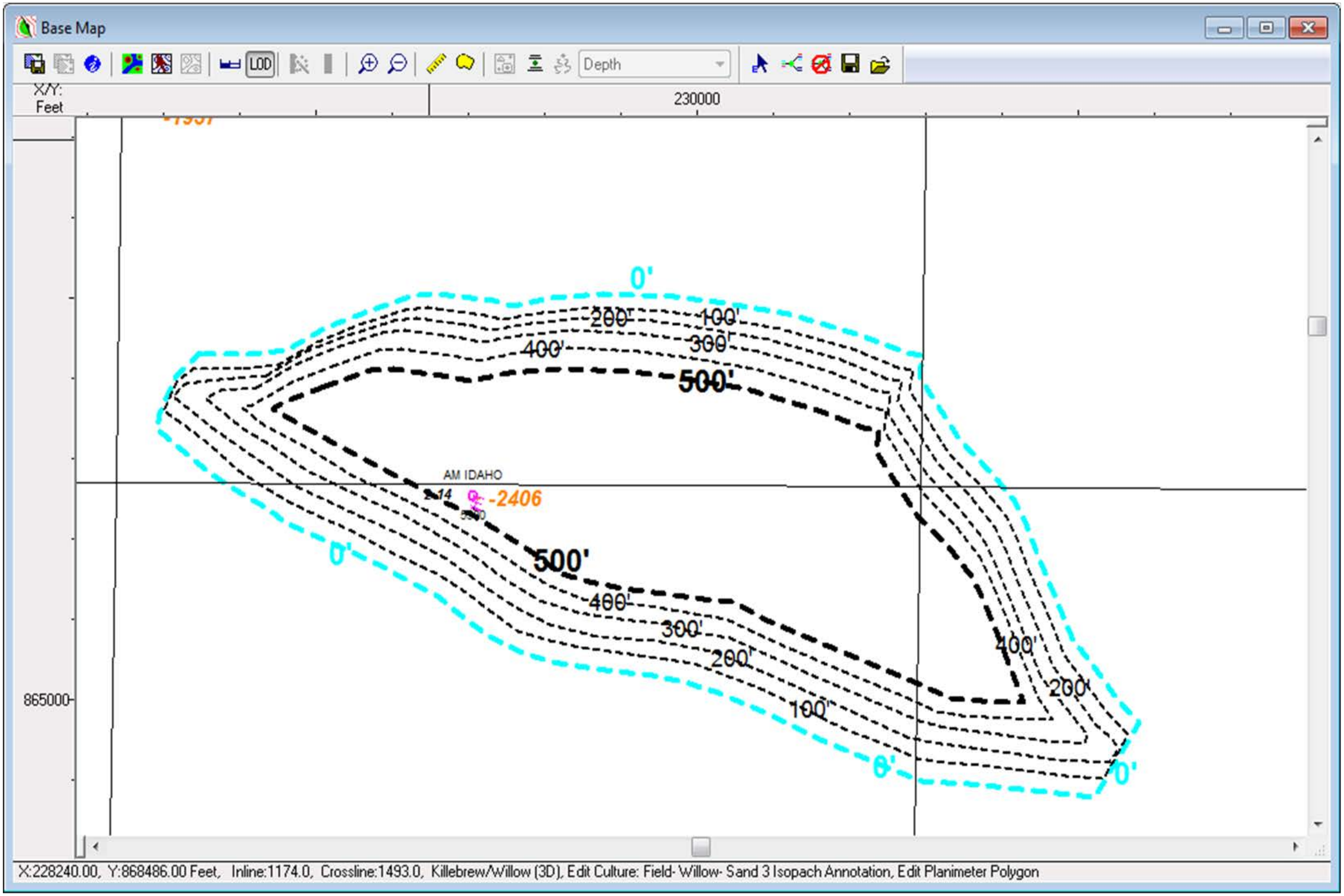
DMS 9/2017

Isopach Map of Sands 3,4,5 –showing Faulting
100’ Contour Interval – Scale 1”:600’



DMS 9/2017

Isopach Map of Sands 3,4, & 5
Scale 1”:600’



DMS 9/2017

ATTACHMENT H

H. OPERATING DATA – The expected average daily rate and volume is 1000 barrels per day (BPD) / 1000 barrels (BBL). The maximum daily rate and volume is expected to be 2600 BWPD / 2600 BBL, based on a mechanistic hydraulic model of the wellbore tubulars and the reservoir characteristics.

The average and maximum surface injection pressures are estimated to be 199 (psig) and 628 psig, respectively, based on the hydraulic model.

The tubing / casing annulus will be filled with 8.8 lb/gallon potassium chloride water, supplemented with an appropriate corrosion inhibitor, biocide, and oxygen scavenger chemical additive package.

A step-rate test will be performed after initial commissioning of the injection facilities and well. The step rate test will allow the reservoir parting pressure to be determined and subsequent injection rates will be limited to maintain injection pressures at least 50 psi below this pressure.

The source of the injection fluid is produced water, associated with the oil and gas production operations of wells operated by Alta Mesa in the surrounding area. An analysis of the produced water is attached (See below - Wastewater Characteristics, EPA Methods). The produced water in this area is very low salinity and low TDS since the geologic sedimentary history is that of a lacustrine nature.

Wastewater Characteristics, EPA Methods

Alta Mesa	Date	Alkalinity (mg CaCO3/L)	Barium (mg/L)	BOD (mg/L)	Boron (mg/L)	Calcium (mg/L)	Chloride (mg/L)	COD (Mg/L)	Conductivity (µmhos/cm)	Cyanide (free) (mg/L)	Fluoride (mg/L)	Hexane extractable material (HEM) (mg/L)	Gross Alpha (pCi/L)	Gross Beta (pCi/L)	Iron (mg/L)	Manganese (mg/L)	Mercury-CVAFS (mg/L)	NO3/N (mg/L)	Potassium....(mg/L)	Radium 226 (pCi/L)	Radium 228 (pCi/L)	Methanol (mg/L)	Silica (as SiO2) (mg/L)	Silicon (mg/L)	Sodium (mg/L)	TDS (mg/L)	TSS (mg/L)	Strontium (mg/L)	Sulfate (mg/L)	MBAS (mg/L)	Turbidity (NTU)
WP4-1	March 13, 2017	525	0.315	>38.0	7.61	70.7	874	277	4320	0.0131	1.89	7.2	0.120 +/- 5.49	592 +/- 31.8	2.54	0.240	4.31	0.477		0.516 +/- 0.292	0.972 +/- 0.220	9470	50.9	23.8	404	2910	12.4	2.15	47.3	0.137	9.66
Tank Battery	May 23, 2016	419	0.144		6.93	16.1	143		1700	0.0197	7.77		0.013 +/- 1.62	20.4 +/- 4.00	2.33		0.476		40.8	0.05 +/- 0.10	-0.136 +/- 0.555	667	77.5	36.2	314	1420	15.7	0.508	9.58	0.166	48.5

Wastewater Characteristics, EPA Methods

Alta Mesa	Date	Diesel (mg/L)	Lube Oil (mg/L)	Gasoline (mg/L)	1,2,4-Trimethylbenzene (ug/L)	1,3,5-Trimethylbenzene (ug/L)	Acetone (ug/L)	Benzene (ug/L)	Ethylbenzene (ug/L)	Isopropylbenzene (ug/L)	m+p-Xylene (ug/L)	Methyl ethyl ketone (MEK) (ug/L)	Naphthalene (ug/L)	n-Propylbenzene (ug/L)	o-Xyllene (ug/L)	Toluene (ug/L)	1-Methylnaphthalene (ug/L)	2,4-Dimethylphenol (ug/L)	2-Methylnaphthalene (ug/L)	2-Mehtylphenol (ug/L)	3+4--Mehtylphenol (ug/L)	Bis(2-Ethylhexyl)phthalate (ug/L)	Fluorene (ug/L)	Naphthalene (ug/L)	Phenanthrene (ug/L)	Phenol (ug/L)	Pyrene (ug/L)
WP5-1 3:00 p.m.	March 13, 2017	438		80.2	178	103	1390	20000	657	41.4	2500	587	44.2	37.4	729	11500											
WP4-1 2:30 p.m.	March 13, 2017	43.1		71.3	182	103	1380	19400	695	40.0	2710	580	48.4	34.8	805	11100	28.4	581	57.0	1020	1590	4.24		74.1		2200	
Tank Battery	May 23, 2016	32.3	7.48	38.4	257	127	13500	24800	1080		4170		59.2		1150	17800	116	571	245	1330	1880	22.3	16.7	265	48.5	3270	21.3

A calculation of the expected injection reservoir capacity was performed. This calculation assumes a confined reservoir pore space as defined by the isopach of the injection zone in a fault block bounded on 3 sides by faults (see Attachment G for details). The bulk volume is calculated by determining the area of each isopach interval and using the average of the areas to calculate the total bulk injection reservoir volume. A porosity of 23% is estimated from open hole wireline logs for the injection interval. Water saturation is estimated at 80%, with a complimentary 20% gas saturation. This is based on the swab test of the 5380-5390 perforations, where gas blows were experienced and a water sample showed the presence of Benzene and other VOC's naturally associated with water associated with hydrocarbon reservoirs. The average net reservoir to bulk thickness ratio is estimated at 90% from a review of the mud log for this interval. The pore space is estimated to contain 152 million reservoir barrels. Under confined injection, the water, gas, and pore space will compress and expand respectively to allow for water influx as pore pressure increases. The maximum allowable pressure is defined by staying 10% below fracture pressure. Fracture pressure is estimated to be equivalent to a 12 lb/gallon gradient (3214 psi at 5150'). Note that the actual parting pressure will be well defined upon completion of the well by the execution of a step rate test. The original pressure is estimated at a pressure equal to an 8.6 lb/gallon equivalent pressure gradient (2276 psi at 5150'). The maximum allowable pressure used in the calculation of Injection Zone Capacity is 90% of the fracture pressure (90% of 3214 = 2892 psi). This provides for an allowable increase in the reservoir pressure of 616 psi (2892-2276). Water, gas, and pore space compressibility's are estimated using standard oil and gas industry correlations. Based on the original reservoir volume, along with the allowable pressure increase and the sum of the compressibilities, it is estimated that a total of 7,773 thousand reservoir barrels can be injected into this space before the pressure limit is reached. This equates to 7,368 thousand stock tank barrels based on a water reservoir volume factor of 1.055 RB/STB.

Calculation of Confined Injection Zone Capacity

DJS Properties #2-14 Injection Zone

Calculation of Reservoir Volumes:

Porosity	0.23	fraction	from well log
Sw	0.80	fraction	water saturation - evidence of gas in swab testing and water analysis
Sg	0.20	fraction	gas saturation - evidence of gas in zone from swab testing - residual gas
Gross Volume	94,700	acre-ft	from planimetry calculations below
Net/Gross Ratio	0.90	fraction	from well logs
Pore Volume	19,603	acre-ft	

Reservoir Isopach Area Planimeter Readings:

CONTOUR LINE VALUE	AREA > (acres)	RATIO OF AREAS	DELTA CONTOUR (ft)	DELTA VOLUME (acre-ft)	
0	269.00				
100	234.00	0.8699	100	25,150.0	
200	205.00	0.8761	100	21,950.0	
300	173.00	0.8439	100	18,900.0	
400	144.00	0.8324	100	15,850.0	
500	113.00	0.7847	100	12,850.0	
		TOTAL ==>		94,700.0	acre-ft - gross bulk reservoir volume

Injection Zone Capacity

Item	Value	Units	Comments - notes
Datum Depth:	5150	ft, BGL	average depth of injection zone
Average Temperature	251	deg F	ML Investments 1-3 production log
Initial Pressure:	2276	psi	8.6 ppg equivalent pore pressure at datum depth
Fracture Pressure:	3214	psi	12 ppg equivalent pore pressure at datum depth
Maximum Allowable Pressure	2892	psi	90% of fracture pressure
Maximum Pressure Increase (dP)	616	psi	maximum allowable pressure less initial pressure
Average Pressure	2584	psi	average of initial pressure and maximum allowable pressure
Water Salinity	750	ppm Cl	estimated average
Water Compressibility	3.48E-06	1/psi	Osif's Correlation
Gas Compressibility	3.87E-04	1/psi	Meehan et al, Gas gravity = 0.65 from ML Investments 1-10 Well
Rock pore volume compressibility	3.50E-06	1/PSI	Hall's Correlation
Reservoir Water Volume Initial	15,682	acre-ft	Pore Volume * Sw
Reservoir Water Volume Initial	121,663,439	RBbls	Pore Volume * Sw
Reservoir Water Volume Compression	261,022	RBbls	dP * water compressibility* initial water volume
Reservoir Gas Space Volume Initial	3,921	acre-ft	Pore Volume * Sg
Reservoir Gas Space Volume Initial	30,415,860	RBbls	Pore Volume * Sg
Gas Pore Space Compression	7,250,191	RBbls	dP * gas compressibility * initial gas volume
Pore Space Volume Increase	262,281	Rbbls	dP * pore space compressibility
Total Pore Space volume increase	7,773,494	RBbls	sum of water, gas, and pore space compression
Bw (water formation volume factor):	1.055	RBbl/STBbl	McCain's Correlation
Total Stock Tank Barrels Capacity	**7,368,241**	**STBbls**	adjust to surface conditions by dividing by water formation volume factor (Bw)

Stock tank barrels are measured at atmospheric pressure and 60 degrees F.

ATTACHMENT I

I. **FORMATION TESTING PROGRAM –** A step rate test will be run at the time of initial completion to determine the actual parting pressure of the injection interval after the packers and tubing is installed. The water used in this test will be from the same source as the proposed source water. Surface injection pressure and injection rates will be measured during the step rate test. The determination of bottom hole parting pressure will be indicated by a departure in the injectivity ratio (dRate/dPressure) when the parting pressure is exceeded. The pressure defined by the intersection of the slopes of the injectivity data below and above parting pressure will define the surface maximum injection pressure. All injection operations will be held to 50 psi or more below this pressure to assure that fracturing of the injection interval does not occur. Bottom hole pressures will be calculated based on the density of the fluid being injected, along with surface pressure measurements. Water samples were collected and analyzed on the interval at 5380-90' and is believed to be representative of the entire interval being proposed for injection.

ATTACHMENT J

J. **STIMULATION PROGRAM –** No stimulation program is expected to be needed. The sandstone in this area has good permeability and the unstimulated injectivity should be sufficient.

ATTACHMENT K

K. **INJECTION PROCEDURES** – Individual monitoring of the DJS Properties #2-14 is planned. Gauges will be installed at the wellsite, and a flow meter will be installed at the pump station. Casing pressure will be maintained at 0 psig. If any pressure is noted on the annulus between the tubing and the production casing, injection will immediately be halted. Injection will not be resumed until the source of the pressure has been identified and repaired. Injection pressure at the wellhead on the tubing will be maintained 50 psi below parting pressure. An initial step-rate test will be performed to determine parting pressure to beginning injection operation. Produced water will be gathered into stock tanks and through additional settling and filtration vessels, as necessary to assure clean water is pumped downhole. A polish filter will be installed at the wellhead to catch any solids that make their way to the wellhead. An injection pump will be located near the stock tanks to pressurize the water and transport the water via flowline to the wellhead. A pressure relief valve will be installed on the pump to prevent excessive pressure from being placed on the flowline. This relief valve will be piped back to the source tanks or to the intake of the pump. Source water will be provided by the producing wells. The flowline will be buried below grade to avoid freezing issues. The portion of the flowline above grade will have insulation and heat tracing to avoid freezing during winter operations. The flowline easement and wellhead will be visually inspected daily (within reason, due to considerations of weather and other force majeure) by field operating personnel.

ATTACHMENT L

L. **CONSTRUCTION PROCEDURES** –

Historical:

Spud well 9/11/2014. Surface hole was drilled with 12 ¼" bit to 1093'. 9 5/8" 40 lb/ft K-55 LTC casing was then set at 1082' and was cemented back to surface. An 8.75" hole was drilled to 5,500' and production casing was then run and cemented (7" 26 lb/ft J-55 LTC casing with bow spring centralizers). A top down cement job was then performed on the 7" casing, to provide cement coverage between the production casing and the surface casing down below the shoe of the surface casing. The prospective hydrocarbon intervals were then tested by perforating and flow/swab tested each of 5 intervals between 5390' and 4306'. All tested non-commercial. The first zone at 5380-5390' did have good gas blows during swabbing. Cement retainers or bridge plugs were set between intervals during the testing operations which proceded from the bottom to the top interval, and was also placed above last interval after testing. Testing was completed by 11/3/2014. See attached wellbore diagram.

Planned Injection Completion Construction:

1. Move in workover rig.
2. Pressure test casing above bridge plug at 4,294'
3. Drill out top plug and cement squeeze perforations in the interval 4,306' – 4,374'.
4. Drill out squeeze and test same. Re-squeeze as necessary.
5. Drill out plugs and retainers to below float collar to 5,450'. If dipole sonic data is not available, run leak-off test prior in the Confining Zone to verify fracture gradient in the Confining Zone.
6. Add perforations in interval 5390 – 5410'.
7. Run tubing, packer and isolation packer to 4880' and set upper packer at 4200'. (see attached wellbore diagram)
8. Hang off tubing and install wellhead assembly.
9. Run step rate test with actual produced water to determine parting pressure and injectivity.
10. Connect gauges and filter pod, flowline, pump, and commission injection system.

ATTACHMENT M

M. **CONSTRUCTION DETAILS** – See the following pages for wellbore schematics.

Alta Mesa Holdings **DJS Properties 2-14**

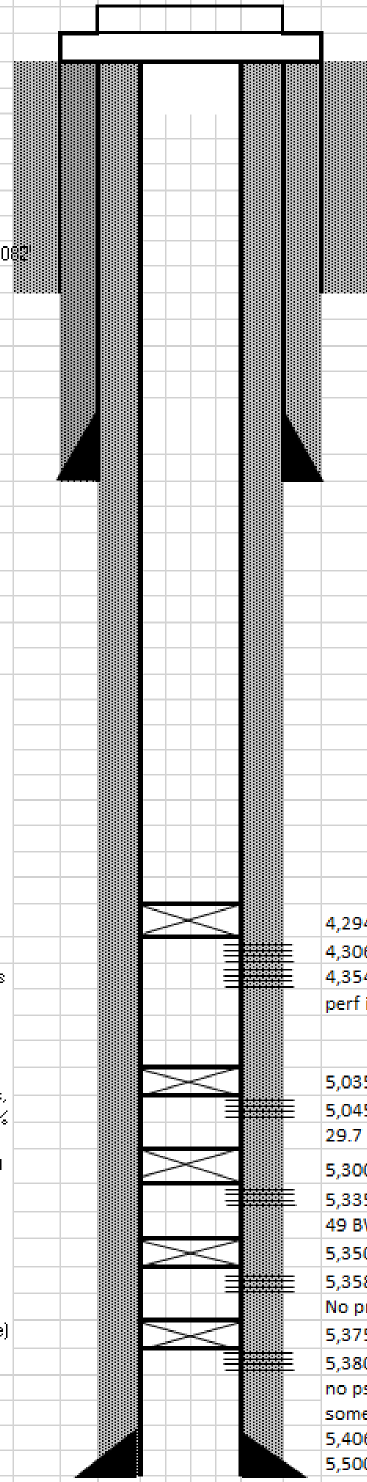
Willow Field - Payett County, ID

Current Wellbore Diagram as of 11/3/2014 - Well Temporarily Abandoned

Spud 9/12/2014 T&A'd 11/3/2014

GL Elevation above MSL: 2,488'

5K Dual - Master Single Wellhead



Casing & Cement

Conductor : 13 3/8 OD, @ 80'

Surface: 24 jts, 9-5/8" OD, 8.83 ID,40#, K-55 @ 1,082'

215 Sacks, (144 Bbls) Type III Cement + Slurrylite 50 Pps, 20% MS-500, 5% HW Gypsum, 5% Salt B.W.O.W., 0.75% TSFL-180, 0.25% CFL-300, 3.77 ft3/sk, 14.22 gal/sk, 10.4 ppg. Followed by 70 sacks, (17 Bbbls) Type III Cement + 5% Salt B.W.O.W., 1.36 ft3/sk, 6.42 gal/sk, 14.8 ppg.

80' 14" Conductor Cmt?????

24 jts 9 5/8" casing
1,034' set float collar — Surface Casing
1 Joint 9 5/8" casing

1,057' TOC
1,082' set float Shoe

Pump Top Job as Follows: Pump 116 sacks (23 Bbls) Calprem Cement + 2% Cacl2, 1.15 ft3/sk, 5 gal/sk, 15.8 ppg. Pump Top out cement @ 1.0 Bpm & 100 psi. (4 Bbls Cement to surface)

Production: 7" OD, 6.276" ID, J-55 @5,500'

Run 122 Total joints of 7", 26# J-55, LTC Casing as follows:

Float Shoe set @ 5,500', 2 Joints of Casing, Float collar set @ 5,406', 120 Joints of casing. Ran 64 Total 7" X 8 1/2" Bow Spring Centralizers, 1-Centralizer 10' above Shoe, 1- Centralizer on 1st casing Collar, 1- Centralizer 10' Below Float Collar, Centralizer on every Joint to Joint # 44 @ 3,509'. Then every 4th Joint to Joint #120 @ 80'. Centralizers Where Installed on collars on Casing Joints. Filled & circulated every 20 joints (No tight hole or problems Running Casing) (Tag with Joint #122 @ 5,500');

Cement as Follows: Pump 10 bbls of Diesel, 25 bbls of 10.0 Ppg Weighted Spacer @ 4.0 Bpm and 250 psi, Followed by 400 Sacks, (129 Bbls) TCI lite 61.6 Pps, Class G Cement, 25.9 Pps Flyash, 5.22 Pps gel, 1.82 ft3/sk, 9.72 gal/sk, 12.7 ppg. Pump Lead cement @ 3 Bpm & 340 psi. Followed by 265 Sacks, (54.7 Bbbls) Gas Seal Cement, Class G Cement, 3% Salt, 0.75% TSFL-180, 0.2% C-49, 1.16 ft3/sk, 4.9 gal/sk, 16.0 ppg. Pump Tail cement @ 3 Bpm & 239 psi. Displace with 208 Total Bbls as Follows: 152 Bbls 4% KCL Water @ 2 Bpm & 1300 Psi, (Lost Returns With 152 Bbls Displacement Away) (No Returns on last 56 Bbls) Pumped last 56 Bbls Displacement @ 1 Bpm & 3,700 Psi. (Bumped plug With 4,200 psi) Bleed off 2.5 Bbls, Check Floats, Floats Held Good. (No Spacer or Cement to Surface)

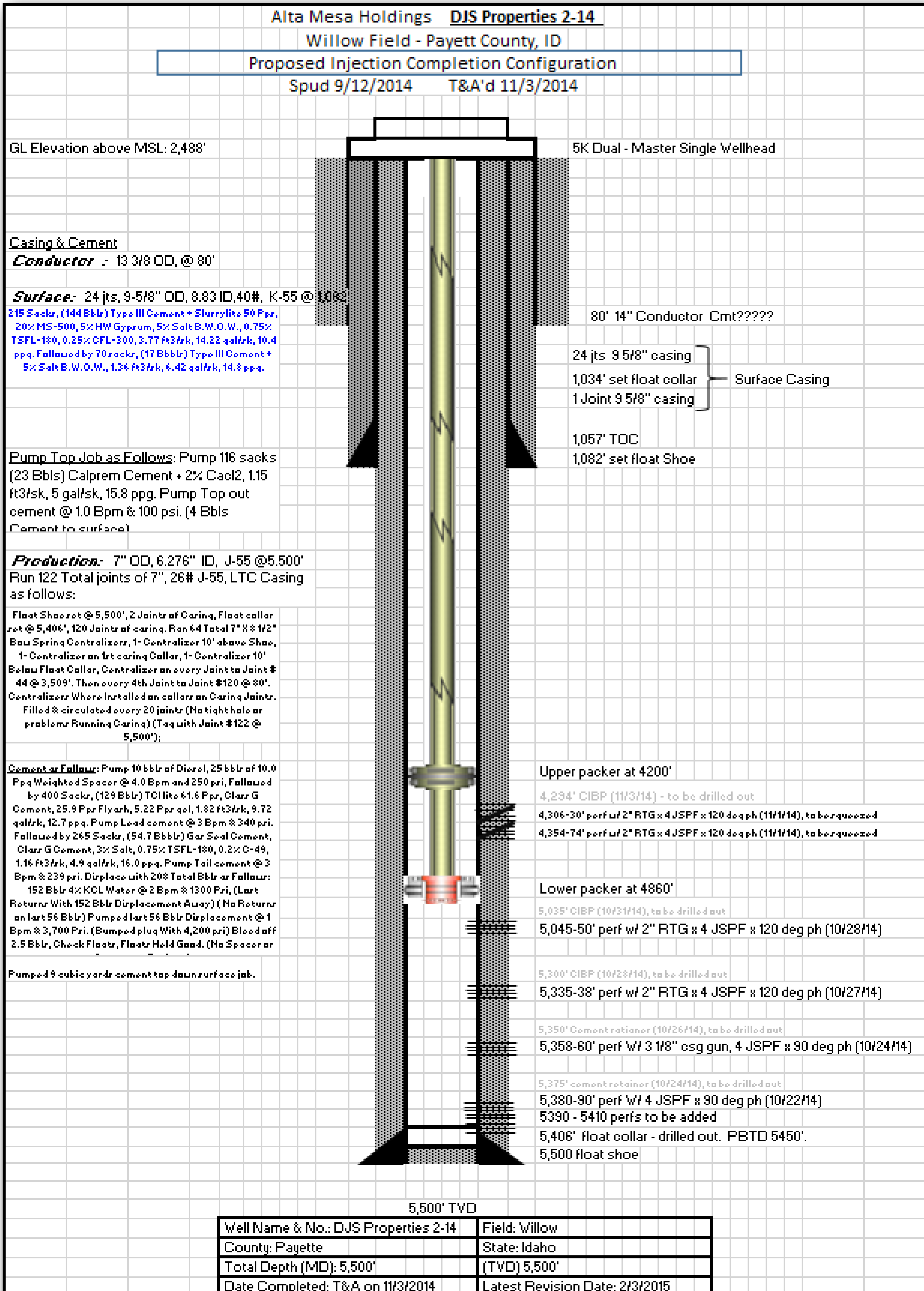
Pumped 9 cubic yards cement top-down job.

4,294' CIBP (11/3/14)
4,306-30' perf w/ 2" RTG x 4 JSPF x 120 deg ph (11/1/14)
4,354-74' perf w/ 2" RTG x 4 JSPF x 120 deg ph (11/1/14)
perf in 2 runs, no prs 13.5 BW, 0 BO, 0 MCF

5,035' CIBP (10/31/14)
5,045-50' perf w/ 2" RTG x 4 JSPF x 120 deg ph (10/28/14)
29.7 BW, 0 BO, 0 MCF
5,300' CIBP (10/28/14)
5,335-38' perf w/ 2" RTG x 4 JSPF x 120 deg ph (10/27/14)
49 BW, 0 BO, 0 MCF
5,350' Cement ratianer (10/26/14)
5,358-60' perf W/ 3 1/8" csg gun, 4 JSPF x 90 deg ph (10/24/14)
No prs after, 2 hrs no flow; 26.1 BW, 0 BO, 0 MCF
5,375' cement retainer (10/24/14)
5,380-90' perf W/ 4 JSPF x 90 deg ph (10/22/14)
no psi after perf - Rec. 37 BW, no oil show
some gas vapers w/ swab runs
5,406' float collar
5,500 float shoe

5,500' TVD

Well Name & No.: DJS Properties 2-14	Field: Willow
County: Payette	State: Idaho
Total Depth (MD): 5,500'	(TVD) 5,500'
Date Completed: T&A on 11/3/2014	Latest Revision Date: 2/3/2015


Alta Mesa Holdings DJS Properties 2-14
Willow Field - Payett County, ID
Proposed Injection Completion Configuration
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GL Elevation above MSL: 2,488'
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Conductor :- 13 3/8 OD, @ 80'
Surface:- 24 jts, 9-5/8" OD, 8.83 ID,40#, K-55 @ 1082'
215 Sacks, (144 Bbls) Type III Cement + Slurrylite 50 Pps, 20% MS-500, 5% HW Gypsum, 5% Salt B.W.O.W., 0.75% TSFL-180, 0.25% CFL-300, 3.77 ft3/sk, 14.22 gal/sk, 10.4 ppg. Followed by 70 sacks, (17 Bbbls) Type III Cement + 5% Salt B.W.O.W., 1.36 ft3/sk, 6.42 gal/sk, 14.8 ppg.
80' 14" Conductor Cmt?????
24 jts 9 5/8" casing
1,034' set float collar
1 Joint 9 5/8" casing
Surface Casing
1,057' TOC
1,082' set float Shoe
Pump Top Job as Follows: Pump 116 sacks (23 Bbls) Calprem Cement + 2% Cacl2, 1.15 ft3/sk, 5 gal/sk, 15.8 ppg. Pump Top out cement @ 1.0 Bpm & 100 psi. (4 Bbls Cement to surface)
Production:- 7" OD, 6.276" ID, J-55 @5.500'
Run 122 Total joints of 7", 26# J-55, LTC Casing as follows:
Float Shoe set @ 5,500', 2 Joints of Casing, Float collar set @ 5,406', 120 Joints of casing. Ran 64 Total 7" X 8 1/2" Bow Spring Centralizers, 1- Centralizer 10' above Shoe, 1- Centralizer on 1st casing Collar, 1- Centralizer 10' Below Float Collar, Centralizer on every Joint to Joint # 44 @ 3,509'. Then every 4th Joint to Joint #120 @ 80'. Centralizers Where Installed on collars on Casing Joints. Filled & circulated every 20 joints (No tight hole or problems Running Casing) (Tag with Joint #122 @ 5,500');
Cement as Follows: Pump 10 bbls of Diesel, 25 bbls of 10.0 Ppg Weighted Spacer @ 4.0 Bpm and 250 psi, Followed by 400 Sacks, (129 Bbls) TCI lite 61.6 Pps, Class G Cement, 25.9 Pps Flyash, 5.22 Pps gel, 1.82 ft3/sk, 9.72 gal/sk, 12.7 ppg. Pump Lead cement @ 3 Bpm & 340 psi. Followed by 265 Sacks, (54.7 Bbbls) Gas Seal Cement, Class G Cement, 3% Salt, 0.75% TSFL-180, 0.2% C-49, 1.16 ft3/sk, 4.9 gal/sk, 16.0 ppg. Pump Tail cement @ 3 Bpm & 239 psi. Displace with 208 Total Bbls as Follows: 152 Bbls 4% KCL Water @ 2 Bpm & 1300 Psi, (Last Returns With 152 Bbls Displacement Away) (No Returns on last 56 Bbls) Pumped last 56 Bbls Displacement @ 1 Bpm & 3,700 Psi. (Bumped plug With 4,200 psi) Bleed off 2.5 Bbls, Check Floats, Floats Hold Good. (No Spacer or
Pumped 9 cubic yards cement top down surface job.
Upper packer at 4200'
4,294' CIBP (11/3/14) - to be drilled out
4,306-30' perf w/ 2" RTG x 4 JSPF x 120 deg ph (11/1/14), to be squeezed
4,354-74' perf w/ 2" RTG x 4 JSPF x 120 deg ph (11/1/14), to be squeezed
Lower packer at 4860'
5,035' CIBP (10/31/14), to be drilled out
5,045-50' perf w/ 2" RTG x 4 JSPF x 120 deg ph (10/28/14)
5,300' CIBP (10/28/14), to be drilled out
5,335-38' perf w/ 2" RTG x 4 JSPF x 120 deg ph (10/27/14)
5,350' Cement retainer (10/26/14), to be drilled out
5,358-60' perf W/ 3 1/8" csg gun, 4 JSPF x 90 deg ph (10/24/14)
5,375' cement retainer (10/24/14), to be drilled out
5,380-90' perf W/ 4 JSPF x 90 deg ph (10/22/14)
5390 - 5410 perfs to be added
5,406' float collar - drilled out. PBTD 5450'.
5,500 float shoe
5,500' TVD
Well Name & No.: DJS Properties 2-14
Field: Willow
County: Payette
State: Idaho
Total Depth (MD): 5,500'
(TVD) 5,500'
Date Completed: T&A on 11/3/2014
Latest Revision Date: 2/3/2015

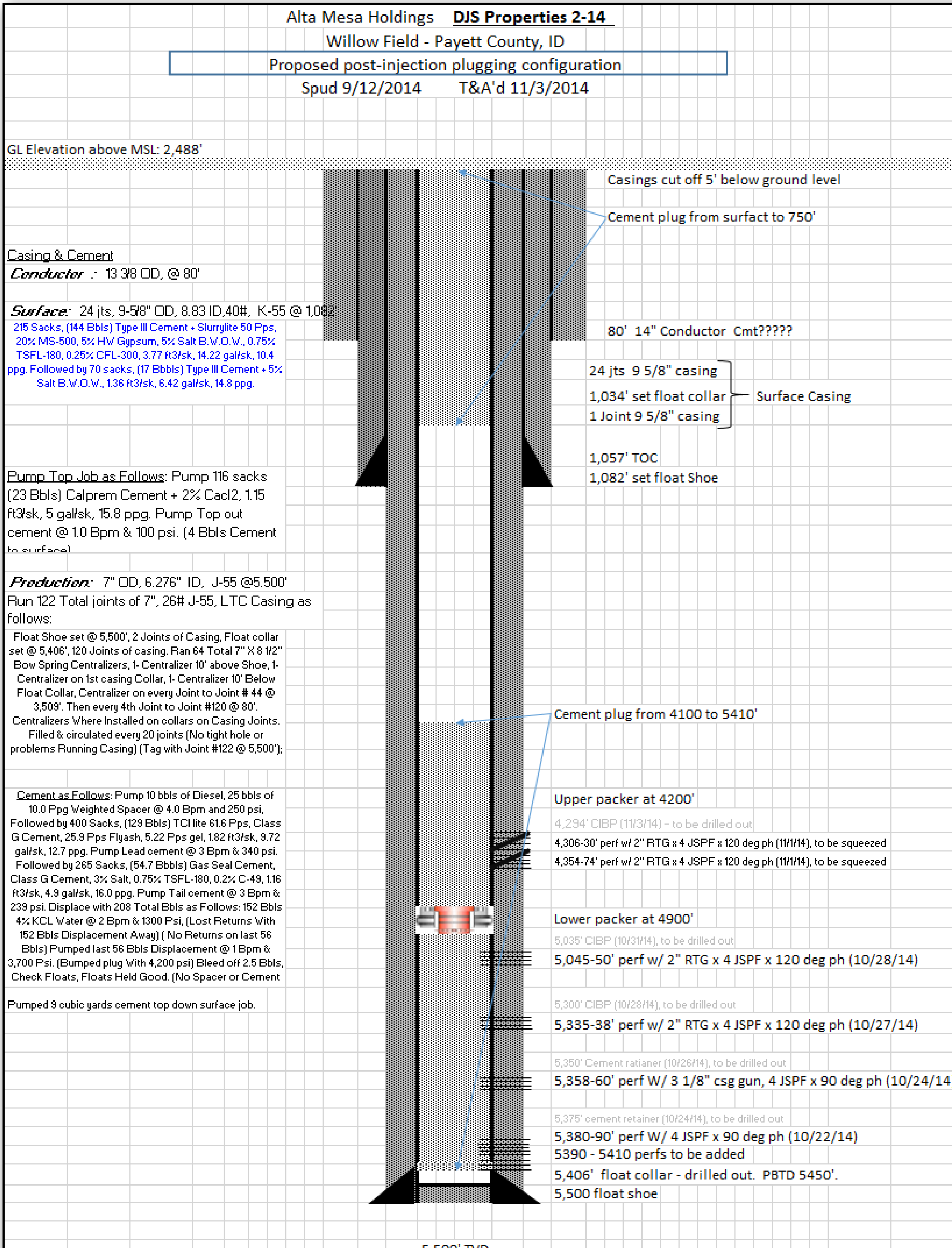
ATTACHMENT O

O. PLANS FOR WELL FAILURES -- The potential areas of concern for this type well are three points: 1) packer to casing seal, 2) tubing connections or tubing body leak, or 3) tubing hanger seals. For any of these components a leak will be indicated by the existence of pressure on the tubing / casing annulus pressure gauge. These type of leaks will be contained within the wellbore envelope. If pressure is observed on the casing gauge, injection operations will immediately cease. The wellhead will be isolated by closing in all wellhead valves and the pump and flowline valves will be closed. The tubing hanger seals will be inspected using a wellhead service company technician who can pressure test the seals for leaks. After this testing is done, a workover rig will be utilized to repair the leaking seals or to pull the tubing and packer so that they can be inspected for leaks and replaced as necessary. Injection will not be reinstated until the leak is repaired and the annulus is pressure tested to verify integrity of the injection components.

Mechanical integrity tests will be run periodically according to permit requirements by applying pressure on the annulus between the production casing and the tubing. This test is designed to detect any production casing weakness. If any leaks are noted, injection operations will not resume until the leak is located and repaired.

ATTACHMENT Q

Q. PLUGGING AND ABANDONMENT PLAN – See proposed Post-Injection Plugging Configuration wellbore diagram and associated EPA Form 7520-14 which details the proposed plugging and abandonment plan for this well.



Well Name & No.: DJS Properties 2-14	Field: Willow
County: Payette	State: Idaho
Total Depth (MD): 5,500'	(TVD) 5,500'
Date Completed: T&A on 11/3/2014	Latest Revision Date: 2/3/2015

OMB No. 2040-0042 Approval Expires 12/31/2018

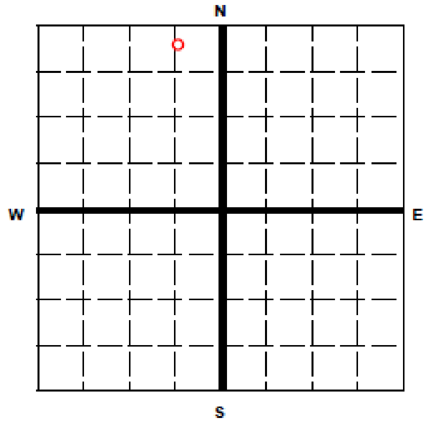
EPA

United States Environmental Protection Agency
Washington, DC 20460

PLUGGING AND ABANDONMENT PLAN

Name and Address of Facility	Name and Address of Owner/Operator
DJS Properties # 2-14	Alta Mesa Services, LP, 15021 Katy Fwy, St 400, Houston, TX 77094

Locate Well and Outline Unit on Section Plat - 640 Acres



State	County	Permit Number
Idaho	Payette	LU600120

Surface Location Description

NE 1/4 of NE 1/4 of NE 1/4 of N 1/4 of Section 14 Township 8N Range 4W

Locate well in two directions from nearest lines of quarter section and drilling unit

Surface
Location 95 ft. frm (N/S) N Line of quarter section
and 2315 ft. from (E/W) W Line of quarter section.

TYPE OF AUTHORIZATION

- [x] Individual Permit
- [ ] Area Permit
- [ ] Rule

Number of Wells 1

Lease Name DJS Properties

WELL ACTIVITY

- [ ] CLASS I
- [x] CLASS II
  - [x] Brine Disposal
  - [ ] Enhanced Recovery
  - [ ] Hydrocarbon Storage
- [ ] CLASS III

Well Number 2-14

CASING AND TUBING RECORD AFTER PLUGGING

SIZE	WT (LB/FT)	TO BE PUT IN WELL (FT)	TO BE LEFT IN WELL (FT)	HOLE SIZE
7"	26	5500	5500	8.75"
9.625"	40	1082	1082	12.75
13.375"	61	120	120	17.5"

METHOD OF EMPLACEMENT OF CEMENT PLUGS

- [x] The Balance Method
- [ ] The Dump Bailer Method
- [ ] The Two-Plug Method
- [x] Other

CEMENTING TO PLUG AND ABANDON DATA:	PLUG #1	PLUG #2	PLUG #3	PLUG #4	PLUG #5	PLUG #6	PLUG #7
Size of Hole or Pipe in which Plug Will Be Placed (inche:	7"	7"					
Depth to Bottom of Tubing or Drill Pipe (ft.	5410	750					
Sacks of Cement To Be Used (each plug)	TBD	TBD					
Slurry Volume To Be Pumped (cu. ft.)	282	162					
Calculated Top of Plug (ft.)	4100	0					
Measured Top of Plug (if tagged ft.)	N/A - future	N/A - future					
Slurry Wt. (Lb./Gal.)	TBD	TBD					
Type Cement or Other Material (Class III)	TBD	TBD					

LIST ALL OPEN HOLE AND/OR PERFORATED INTERVALS AND INTERVALS WHERE CASING WILL BE VARIED (if any)

From	To	From	To
4306	4330 (existing perfs)	5380	5390 (existing perfs)
4354	4374 (existing perfs)	5390	5410 (to be added for injection)
5045	5050 (existing perfs)		
5335	5360 (existing perfs)		

Estimated Cost to Plug Wells

TBD - cement type, volumes, density and type to be determined based on regulatory requirements and products in existence at time of plugging.

Certification

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibliity of fine and imprisonment. (Ref. 40 CFR 144.32)

Name and Official Title *(Please type or print)*	Signature	Date Signed

EPA Form 7520-14 (Rev. 12-11)

ATTACHMENT R

R. NECESSARY RESOURCES

IDAHO DEPARTMENT OF LANDS

This bond replaces and supersedes Aspen American Insurance Co Bond No. SU46286 effective March 28, 2016.

IDAHO OIL AND GAS CONSERVATION COMMISSION

BOND

Bond No. 1138356

Known all men by these presents, that we: Alta Mesa Services, LP of the County of: Harris in the state of: Texas as principal, and Lexon Insurance Company of 10002 Shelbyville Rd. Suite 100, Louisville, KY 40223 as surety, authorized to do business in this State, are held and firmly bound unto the State in the penal sum as indicated, lawful money of the United States, for which payment, well and truly to be make, we bind ourselves, and each of us, and each of our heirs, executors, administrators or successors, and assigns jointly and severally, firmly by these presents.

The condition of this obligation is that whereas the above bounden principal proposes to drill a well or wells for oil, gas, or stratigraphic purposes in and upon the following described land situated within the State, to wit: *(May be used for blanket bond or for single well)*

See attached Exhibit "A"

NOW, THEREFORE, if the above bounden principal shall comply with all of the provisions of the laws of the State and the rules, regulations and orders of the Conservation Commission of the State, especially with reference to the proper plugging of said well or wells, and filing with the Oil and Gas Conservation commission of this State all notices and records required by said Commission, in the event said well or wells do not produce oil or gas in commercial quantities, or cease to produce oil or gas in commercial quantities, then this obligation is void; otherwise, the same shall be and remain in full force and effect.

Penal Sum of One Hundred Thousand and No/100 ($100,000.00).

Witness our hands and seals, this 28th day of March, 2016.

Principal: Alta Mesa Services, LP

Principal: [signature]
Michael A. McCabe, CFO

Witness our hands and seals, this 28th day of March, 2016.

Surety (print): Lexon Insurance Company

Surety(signature): [signature]
Teresa D. Kelly, Attorney-in-Fact

(If the principal is a corporation, the bond should be executed by its duly authorized officers, with the seal of the corporation affixed. When principal or surety executes this bond by agent, power of attorney or other evidence of authority must accompany the bond.)

Idaho Oil and Gas Conservation Commission

Approval Date: ____________________

____
Secretary

POA #LX-264759

Form No. P-2

IDAHO DEPARTMENT OF LANDS

This bond replaces and supersedes Aspen American Insurance Company Bond No. SU46311 effective March 28, 2016.

State of Idaho
DEPARTMENT OF LANDS

Surety Bond Number 1136357

Lease/Plan/Permit No(s). See Attached Exhibit "A"

KNOW ALL MEN BY THESE PRESENTS, That we AM Idaho LLC, as principal and Lexon Insurance Company, a corporation organized under the laws of the State of Texas, and having its principal place of business in the State of Kentucky, in the City of Louisville, as surety are held and firmly bound unto the State of Idaho, in the sum of One Hundred Thousand------ dollars ($ 100,000.00) lawful money of the United States, conditioned on the payment of all damages to the surface and improvements thereon of lands described in the above lease/plan/permit specified and any outstanding balances as set forth in the lease/plan/permit. For such payment, well and truly to be made, we bind ourselves, our and each of our heirs, executors, administrators, successors and assignees, as the case may be, jointly and severally, firmly by these presents.

THE CONDITION of the foregoing obligation is such that:

WHEREAS, by lease/plan/permit bearing the above serial number, the lessee/plan holder/permittee was granted specific rights under and pursuant to Idaho Code title 58, chapters 1,3 and 6 or Idaho Code title 47, chapters 7, 8, 13, 15 or 16, and the pertinent rules and regulations of the Idaho State Board of Land Commissioners; and

WHEREAS, said lessee/plan holder/permittee has, by virtue of the lease/plan/permit above referred to, entered into certain covenants and agreements set forth in such lease/plan/permit, under which operations are to be conducted; and

WHEREAS, the said principal, in consideration of being permitted, in lieu of the lessee/plan holder/permittee, to furnish this bond agrees and by these presents does hereby bond himself to fulfill on behalf of the lessee/plan holder/permittee all of the obligations of the said lease/plan/permit in the same manner and to the same extent as though he were the lessee/plan holder/permittee. It is understood and agreed by the surety and the principal that if there is outstanding restoration obligations on the premises, or if outstanding payments are due, this bond shall extend to cover all acts for which restoration is required or payment of such outstanding amounts due, both prior to and subsequent to the date of this bond, until notified in writing by the Idaho Department of Lands that such requirements have been met or the bond has been replaced. The Idaho Department of Lands may require payment of the entire sum of this bond, or portions thereof, upon written notice to the surety, by the department, of the lessee/plan holder/permittee's failure to perform any obligations and/or pay any amounts due under the above referenced statutes and pertinent rules.

The surety shall pay to the Department of Lands the sum of this bond, or portions thereof, as requested by the department within 30 days of receipt of such written notice. In the event of a partial distribution, the remaining funds and liabilities shall not be released until the department notifies the surety, in writing, of release of remaining liability or requires payment of the remaining bond liabilities. Payment of the full sum of the bond to the department shall release the surety of all liabilities and obligations.

NOW THEREFORE, if the above principal shall in good faith observe, carry out and comply with all the laws now existing or hereafter enacted, designed or intended for the protection of the surface owner of said lands against damage and resulting loss caused by any operations carried on under said lease/plan/permit, or if any such damage and resulting loss shall so occur nevertheless, for which damage and loss reimbursement is required and made, then this obligation shall become void, otherwise to remain in full force and effect; and the liability of the surety under this bond for any one or more defaults of the principal under said lease/plan/permit shall not exceed in the aggregate the sum stated herein above; It is further provided, however, that the bond may be cancelled by the surety by the service of written notice of cancellation upon the Director of the Department of Lands of the State of Idaho, such cancellation to be effective at the expiration of ninety (90) days after the service of such cancellation notice by the surety on the Director by registered mail. Such cancellation notice, however, shall not affect any liability that shall have accrued under this bond prior to the effective date of cancellation.

Signed on this 28th day of March, 2016

(Signature of Principal) Michael A. McCabe, CFO
15021 Katy Frwy, Suite 400, Houston, TX 77094
(Business Address)

(Signature of Surety) Teresa D. Kelly, Attorney-in-Fact
10002 Shelbyville Rd, Suite 100, Louisville, KY 40223
(Business Address)

ACKNOWLEDGEMENT OF SURETY

State of Texas)
) ss
County of Harris)

On this 28th day of March, in the year 2016, before me Candace D. Bosheers, a Notary Public in and for the State of Texas, personally appeared Teresa D. Kelly, known to me to be the attorney-in-fact of the corporation that executed the instrument, or the person who executed the instrument on behalf of said corporation, and acknowledged to me that such corporation executed the same.

In Witness Whereof, I have hereunto set my hand and affixed my official seal of day and year first above written.

Notary Public For Harris County, Texas
Residing at: 5444 Westheimer, Suite 900, Houston, TX 77056
My Commission expires January 24, 2020

POA #LX-264760

IDL 1801-29(26) 5-1-2002

ATTACHMENT S

S. **AQUIFER EXEMPTION FOR INJECTION ZONE** – See next three (3) pages for water analysis of the water produced from perforations at 5380 – 5390, which characterizes the water in the proposed injection zone. The depth of this zone, along with the presence of Benzene and other volatile organic compounds would limit or prevent the use of the water in this zone for aquifer uses.

Analytical Laboratories, Inc.
1804 N. 33rd Street
Boise, Idaho 83703
Phone (208) 342-5515

Attn: JEFF JANIK
ALTA MESA SERVICES, LP
15021 KATY FREEWAY STE 400
HOUSTON, TX 77094

Collected By: J JANIK
Submitted By: J JANIK

Perfs 5380 - 5390'

Source of Sample:
DJS PROP 2-14 PRODUCOD WATER

Time of Collection: 16:00
Date of Collection: 10/22/2014
Date Received: 10/23/2014
Report Date: 11/7/2014

Field Temp:
Temp Rcvd in Lab: 20.4 °C
PWS:
PWS Name

Laboratory Analysis Report

Sample Number: 1442245

NO FIELD TEMP GIVEN; NO TRAVEL BLANKS RCVD; Methane, Ethane, and Ethene testing were performed by Accutest Mountain States (AMS).

Test Requested	MCL	Analysis Result	Units	MDL	Method	Date Completed	Analyst
Aluminum, Al	UR	1.12	mg/L	0.10	EPA 200.7	10/24/2014	KC
Arsenic Low	0.01	< 0.005	mg/L	0.005	EPA 200.8	11/3/2014	JH
Barium, Ba	2	0.12	mg/L	0.05	EPA 200.7	10/24/2014	KC
Boron, B		7.40	mg/L	0.10	EPA 200.7	11/4/2014	KC
Calcium, Ca	UR	51.1	mg/L	0.50	EPA 200.7	10/28/2014	KC
Iron, Fe	UR	11.9	mg/L	0	EPA 200.7	10/29/2014	KC
Magnesium, Mg	UR	0.50	mg/L	0.50	EPA 200.7	10/28/2014	KC
Manganese Low		0.128	mg/L	0.005	EPA 200.7	10/24/2014	KC
Potassium, K	UR	56.7	mg/L	0.5	EPA 200.7	10/28/2014	KC
Selenium Low	0.05	< 0.005	mg/L	0.005	EPA 200.8	11/3/2014	JH
Silica	UR	106	mg/L	0.25	EPA 200.7	11/4/2014	KC
Sodium, Na	UR	392	mg/L	0.50	EPA 200.7	10/28/2014	KC
Uranium, U	30	< 5	ug/L	5	EPA 200.8	11/3/2014	JH
Metals Digestion		*			EPA 200.9-11	10/23/2014	JMS
Density		0.998	g/mL		Gravimetric	11/4/2014	JH
Nitrate (as N)		< 0.2	mg/L	0.2	EPA 300.0	10/23/2014	NC

MCL = Maximum Contamination Level
MDL = Method/Minimum Detection Limit
UR = Unregulated

Date Report Printed: 11/7/2014 11:59:12

Laboratory Analysis Report

Sample Number: 1442245

NO FIELD TEMP GIVEN; NO TRAVEL BLANKS RCVD; Methane, Ethane, and Ethene testing were performed by Accutest Mountain States (AMS).

Test Requested	MCL	Analysis Result	Units	MDL	Method	Date Completed	Analyst
Benzene		1510	ug/L	0.5	EPA 8260B	10/28/2014	CY
Toluene		830	ug/L	0.5	EPA 8260B	10/28/2014	CY
Ethylbenzene		55.0	ug/L	0.5	EPA 8260B	10/28/2014	CY
Xylene, Total		390	ug/L	0.5	EPA 8260B	10/28/2014	CY
Methane		2.49	mg/L	0.0008	RSKSOP 175	10/27/2014	AMS
Ethane		0.399	mg/L	0.0016	RSKSOP 175	10/27/2014	AMS
Ethene		<0.0024	mg/L	0.0024	RSKSOP 175	10/27/2014	AMS
Alkalinity	UR	332	mg/L CaCO3		EPA 310.1	10/30/2014	CJS
Chloride, Cl	UR	305	mg/L	1	EPA 300.0	10/23/2014	NC
Fluoride, F	4.0	6.88	mg/L	0.10	EPA 300.0	10/23/2014	NC
Sulfate, SO4	UR	34	mg/L	1	EPA 300.0	10/23/2014	NC
pH	UR	8.8	S.U.		SM 4500-H B	10/23/2014	RME
Conductivity	UR	1,880	umhos	2	SM 2510B	10/23/2014	RME
Bicarbonate		302	mg/L		SM 2320	10/30/2014	CJS
Carbonate		29.8	mg/L		SM 2320	10/30/2014	CJS
Hydroxide		0.0	mg/L		SM 2320	10/30/2014	CJS
Resistivity		5.32	ohm*cm			10/23/2014	DS
Total Dissolved Solids	UR	1,540	mg/L	25	SM 2540C	10/28/2014	GM

MCL = Maximum Contamination Level
MDL = Method/Minimum Detection Limit
UR = Unregulated

Thank you for choosing Analytical Laboratories for your testing needs.
If you have any questions concerning this report,
please contact your client manager: James Hibbs

Page 2 of 2

Date Report Printed: 11/7/2014 11:59:12

Analytical Laboratories, Inc.
1804 N. 33rd Street
Boise, Idaho 83703
Phone (208) 342-5515

Date Report Printed: 11/21/2014 3:49:55 PM
http://www.analyticallaboratories.com
These test results relate only to the items tested.

Laboratory Analysis Report

Sample Number: 1442246

Attn: JEFF JANIK
ALTA MESA SERVICES, LP
15021 KATY FREEWAY STE 400
HOUSTON, TX 77094

Collected By: J JANIK
Submitted By: J JANIK

Source of Sample:
DJS PROP 2-14 PRODUCOD WATER

Time of Collection: 16:00
Date of Collection: 10/22/2014
Date Received: 10/23/2014
Report Date: 11/21/2014

PWS#:

Field Temp: Temp Rcvd in Lab: 20.4 °C

PWS Name:

NO FIELD TEMP GIVEN; Radiological testing was performed by Summit Environmental (SUM).

Test Requested	MCL	Analysis Result	Units	MDL	Method	Date Completed	Analyst
Gross Alpha	15 pCi	<3	pCi/L	3	EPA 900.0	11/11/2014	SUM
Gross Beta		57+/-5.8	pCi/L	4	EPA 900.0	11/11/2014	SUM

Thank you for choosing Analytical Laboratories for your testing needs.

If you have any questions about this report, or any future analytical needs, please contact your client manager:
James Hibbs

MCL – Maximum Contamination Level
MDL – Method/Minimum Detection Limit
UR = Unregulated

Page 1 of 1

ATTACHMENT U

U. DESCRIPTION OF BUSINESS - Alta Mesa Services, LP is the operating subsidiary of Alta Mesa Holdings, LP. Alta Mesa Holdings, LP is a privately-held, independent exploration and production company, primarily engaged in the acquisition, exploration, development and production of oil, natural gas and natural gas liquids within the United States.

OMB No. 2040-0042 Approval Expires 12/31/2018

United States Environmental Protection Agency

EPA

Underground Injection Control
Permit Application

(Collected under the authority of the Safe Drinking Water Act. Sections 1421, 1422, 40 CFR 144)

I. EPA ID Number		T/A	C
U			

Read Attached Instructions Before Starting

For Official Use Only

Application approved (mo day year)	Date received (mo day year)	Permit Number	Well ID	FINDS Number

II. Owner Name and Address	
Owner Name	Alta Mesa Services, LP
Street Address	15021 Katy Freewway, Suite 400
Phone Number	(281) 530-0991
City	Houston
State	TX
ZIP CODE	77094

III. Operator Name and Address	
Owner Name	Alta Mesa Services, LP
Street Address	15021 Katy Freeway, Suite 400
Phone Number	(281) 530-0991
City	Houston
State	TX
ZIP CODE	77094

IV. Commercial Facility	V. Ownership	VI. Legal Contact	VII. SIC Codes
[x] Yes [ ] No	[x] Private [ ] Federal [ ] Other	[x] Owner [ ] Operator	NAICS=211111 SIC = 1311

VIII. Well Status *(Mark "x")*

[ ] A Operating	Date Started (mo day year)	[x] B. Modification/Conversion	[x] C. Proposed

IX. Type of Permit Requested *(Mark "x" and specify if required)*

[x] A. Individual [ ] B. Area	Number of Existing Wells	Number of Proposed Wells	Name(s) of field(s) or project(s)
	1 (One)	1 (One)	DJS Properties 2-14

X. Class and Type of Well *(see reverse)*

A. Class(es) (enter code(s))	B. Type(s) (enter code(s))	C. If class is "other" or type is code 'x,' explain	D. Number of wells per type (if area permit)
Class II	Type D	N/A	1 (One)

XI. Location of Well(s) or Approximate Center of Field or Project

Latitude Deg	Latitude Min	Latitude Sec	Longitude Deg	Longitude Min	Longitude Sec	Township and Range Sec	Twp	Range	1/4 Sec	Feet From	Line	Feet From	Line
44	02	19.2	116	46	60	14	8N	4W	NW	95	NL	2315	WL

XII. Indian Lands (Mark 'x')

[ ] Yes
[x] No

XIII. Attachments

(Complete the following questions on a separate sheet(s) and number accordingly; see instructions)

For Classes I, II, III, (and other classes) complete and submit on a separate sheet(s) Attachments A--U (pp 2-6) as appropriate. Attach maps where required. List attachments by letter which are applicable and are included with your application.

XIV. Certification

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibliity of fine and imprisonment. (Ref. 40 CFR 144.32)

A. Name and Title *(Type or Print)*	B. Phone No. *(Area Code and No.)*
Dale R. Hayes, VP Frontier Operations	(281) 943-1347
C. Signature	**D. Date Signed**
D.R. Hayes	08/07/2017

Well Class and Type Codes

Class I Wells used to inject waste below the deepest underground source of drinking water.

Type "I" Nonhazardous industrial disposal well
"M" Nonhazardous municipal disposal well
"W" Hazardous waste disposal well injecting below USDWs
"X" Other Class I wells (not included in Type "I," "M," or "W")

Class II Oil and gas production and storage related injection wells.

Type "D" Produced fluid disposal well
"R" Enhanced recovery well
"H" Hydrocarbon storage well (excluding natural gas)
"X" Other Class II wells (not included in Type "D," "R," or "H")

Class III Special process injection wells.

Type "G" Solution mining well
"S" Sulfur mining well by Frasch process
"U" Uranium mining well (excluding solution mining of conventional mines)
"X" Other Class III wells (not included in Type "G," "S," or "U")

Other Classes Wells not included in classes above.
Class V wells which may be permitted under §144.12.
Wells not currently classified as Class I, II, III, or V.

Attachments to Permit Application

Class	**Attachments**
I new well	A, B, C, D, F, H – S, U
existing	A, B, C, D, F, H – U
II new well	A, B, C, E, G, H, M, Q, R; optional – I, J, K, O, P, U
existing	A, E, G, H, M, Q, R, – U; optional – J, K, O, P, Q
III new well	A, B, C, D, F, H, I, J, K, M – S, U
existing	A, B, C, D, F, H, J, K, M – U
Other Classes	To be specified by the permitting authority

INSTRUCTIONS - Underground Injection Control (UIC) Permit Application

Paperwork Reduction Act: The public reporting and record keeping burden for this collection of information is estimated to average 224 hours for a Class I hazardous well application, 110 hours for a Class I non-hazardous well application, 67 hours for a Class II well application, and 132 hours for a Class III well application. Burden means the total time, effort, or financial resource expended by persons to generate, maintain, retain, or disclose or provide information to or for a Federal Agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to be able to respond to the collection of information; search data sources; complete and review the collection of information; and, transmit or otherwise disclose the information. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including the use of automated collection techniques to Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822), 1200 Pennsylvania Ave., NW, Washington, DC 20460. Include the OMB control number in any correspondence. Do not send the completed forms to this address.

This form must be completed by all owners or operators of Class I, II, and III injection wells and others who may be directed to apply for permit by the Director.

I. **EPA I.D. NUMBER** - Fill in your EPA Identification Number. If you do not have a number, leave blank.

II. **OWNER NAME AND ADDRESS** - Name of well, well field or company and address.

III. **OPERATOR NAME AND ADDRESS** - Name and address of operator of well or well field.

IV. **COMMERCIAL FACILITY** - Mark the appropriate box to indicate the type of facility.

V. **OWNERSHIP** - Mark the appropriate box to indicate the type of ownership.

VI. **LEGAL CONTACT** - Mark the appropriate box.

VII. **SIC CODES** - List at least one and no more than four Standard Industrial Classification (SIC) Codes that best describe the nature of the business in order of priority.

VIII. **WELL STATUS** - Mark Box A if the well(s) were operating as injection wells on the effective date of the UIC Program for the State. Mark Box B if wells(s) existed on the effective date of the UIC Program for the State but were not utilized for injection. Box C should be marked if the application is for an underground injection project not constructed or not completed by the effective date of the UIC Program for the State.

IX. **TYPE OF PERMIT** - Mark "Individual" or "Area" to indicate the type of permit desired. Note that area permits are at the discretion of the Director and that wells covered by an area permit must be at one site, under the control of one person and do not inject hazardous waste. If an area permit is requested the number of wells to be included in the permit must be specified and the wells described and identified by location. If the area has a commonly used name, such as the "Jay Field," submit the name in the space provided. In the case of a project or field which crosses State lines, it may be possible to consider an area permit if EPA has jurisdiction in both States. Each such case will be considered individually, if the owner/operator elects to seek an area permit.

X. **CLASS AND TYPE OF WELL** - Enter in these two positions the Class and type of injection well for which a permit is requested. Use the most pertinent code selected from the list on the reverse side of the application. When selecting type X please explain in the space provided.

XI. **LOCATION OF WELL** - Enter the latitude and longitude of the existing or proposed well expressed in degrees, minutes, and seconds or the location by township, and range, and section, as required by 40 CFR Part 146. If an area permit is being requested, give the latitude and longitude of the approximate center of the area.

XII. **INDIAN LANDS** - Place an "X" in the box if any part of the facility is located on Indian lands.

XIII. **ATTACHMENTS** - Note that information requirements vary depending on the injection well class and status. Attachments for Class I, II, III are described on pages 4 and 5 of this document and listed by Class on page 2. Place EPA ID number in the upper right hand corner of each page of the Attachments.

XIV. **CERTIFICATION** - All permit applications (except Class II) must be signed by a responsible corporate officer for a corporation, by a general partner for a partnership, by the proprietor of a sole proprietorship, and by a principal executive or ranking elected official for a public agency. For Class II, the person described above should sign, or a representative duly authorized in writing.

Attachments to be submitted with permit application for Class I, II, III and other wells.

A. **AREA OF REVIEW METHODS** - Give the methods and, if appropriate, the calculations used to determine the size of the area of review (fixed radius or equation).The area of review shall be a fixed radius of 1/4 mile from the well bore unless the use of an equation is approved in advance by the Director.

B. **MAPS OF WELL/AREA AND AREA OF REVIEW** - Submit a topographic map, extending one mile beyond the property boundaries, showing the injection well(s) or project area for which a permit is sought and the applicable area of review. The map must show all intake and discharge structures and all hazardous waste treatment, storage, or disposal facilities. If the application is for an area permit, the map should show the distribution manifold (if applicable) applying injection fluid to all wells in the area, including all system monitoring points. Within the area of review, the map must show the following:

Class I

The number, or name, and location of all producing wells, injection wells, abandoned wells, dry holes, surface bodies of water, springs, mines (surface and subsurface), quarries, and other pertinent surface features, including residences and roads, and faults, if known or suspected. In addition, the map must identify those wells, springs, other surface water bodies, and drinking water wells located within one quarter mile of the facility property boundary. Only information of public record is required to be included in this map;

Class II

In addition to requirements for Class I, include pertinent information known to the applicant. This requirement does not apply to existing Class II wells;

Class III

In addition to requirements for Class I, include public water systems and pertinent information known to the applicant.

C. **CORRECTIVE ACTION PLAN AND WELL DATA** - Submit a tabulation of data reasonably available from public records or otherwise known to the applicant on all wells within the area of review, including those on the map required in B, which penetrate the proposed injection zone. Such data shall include the following:

Class I

A description of each well's types, construction, date drilled, location, depth, record of plugging and/or completion, and any additional information the Director may require. In the case of new injection wells, include the corrective action proposed to be taken by the applicant under 40 CFR 144.55.

Class II

In addition to requirement for Class I, in the case of Class II wells operating over the fracture pressure of the injection formation, all known wells within the area of review which penetrate formations affected by the increase in pressure. This requirement does not apply to existing Class II wells.

Class III

In addition to requirements for Class I, the corrective action proposed under 40 CFR 144.55 for all Class III wells.

D. **MAPS AND CROSS SECTION OF USDWs** - Submit maps and cross sections indicating the vertical limits of all underground sources of drinking water within the area of review (both vertical and lateral limits for Class I), their position relative to the injection formation and the direction of water movement, where known, in every underground source of drinking water which may be affected by the proposed injection. (Does not apply to Class II wells.)

E. **NAME AND DEPTH OF USDWs (CLASS II)** - For Class II wells, submit geologic name, and depth to bottom of all underground sources of drinking water which may be affected by the injection.

F. **MAPS AND CROSS SECTIONS OF GEOLOGIC STRUCTURE OF AREA** - Submit maps and cross sections detailing the geologic structure of the local area (including the lithology of injection and confining intervals) and generalized maps and cross sections illustrating the regional geologic setting. (Does not apply to Class II wells.)

G. **GEOLOGICAL DATA ON INJECTION AND CONFINING ZONES (Class II)** - For Class II wells, submit appropriate geological data on the injection zone and confining zones including lithologic description, geological name, thickness, depth and fracture pressure.

H. **OPERATING DATA** - Submit the following proposed operating data for each well (including all those to be covered by area permits): (1) average and maximum daily rate and volume of the fluids to be injected; (2) average and maximum injection pressure; (3) nature of annulus fluid; (4) for Class I wells, source and analysis of the chemical, physical, radiological and biological characteristics, including density and corrosiveness, of injection fluids; (5) for Class II wells, source and analysis of the physical and chemical characteristics of the injection fluid; (6) for Class III wells, a qualitative analysis and ranges in concentrations of all constituents of injected fluids. If the information is proprietary, maximum concentrations only may be submitted, but all records must be retained.

I. **FORMATION TESTING PROGRAM** - Describe the proposed formation testing program. For Class I wells the program must be designed to obtain data on fluid pressure, temperature, fracture pressure, other physical, chemical, and radiological characteristics of the injection matrix and physical and chemical characteristics of the formation fluids.

For Class II wells the testing program must be designed to obtain data on fluid pressure, estimated fracture pressure, physical and chemical characteristics of the injection zone. (Does not apply to existing Class II wells or projects.)

For Class III wells the testing must be designed to obtain data on fluid pressure, fracture pressure, and physical and chemical characteristics of the formation fluids if the formation is naturally water bearing. Only fracture pressure is required if the program formation is not water bearing. (Does not apply to existing Class III wells or projects.)

J. **STIMULATION PROGRAM** - Outline any proposed stimulation program.

K. **INJECTION PROCEDURES** - Describe the proposed injection procedures including pump, surge, tank, etc.

L. **CONSTRUCTION PROCEDURES** - Discuss the construction procedures (according to §146.12 for Class I, §146.22 for Class II, and §146.32 for Class III) to be utilized. This should include details of the casing and cementing program, logging procedures, deviation checks, and the drilling, testing and coring program, and proposed annulus fluid. (Request and submission of justifying data must be made to use an alternative to packer for Class I.)

M. **CONSTRUCTION DETAILS** - Submit schematic or other appropriate drawings of the surface and subsurface construction details of the well.

N. **CHANGES IN INJECTED FLUID** - Discuss expected changes in pressure, native fluid displacement, and direction of movement of injection fluid. (Class III wells only.)

O. **PLANS FOR WELL FAILURES** - Outline contingency plans (proposed plans, if any, for Class II) to cope with all shut-ins or wells failures, so as to prevent migration of fluids into any USDW.

P. **MONITORING PROGRAM** - Discuss the planned monitoring program. This should be thorough, including maps showing the number and location of monitoring wells as appropriate and discussion of monitoring devices, sampling frequency, and parameters measured. If a manifold monitoring program is utilized, pursuant to §146.23(b)(5), describe the program and compare it to individual well monitoring.

Q. **PLUGGING AND ABANDONMENT PLAN** - Submit a plan for plugging and abandonment of the well including: (1) describe the type, number, and placement (including the elevation of the top and bottom) of plugs to be used; (2) describe the type, grade, and quantity of cement to be used; and (3) describe the method to be used to place plugs, including the method used to place the well in a state of static equilibrium prior to placement of the plugs. Also for a Class III well that underlies or is in an exempted aquifer, demonstrate adequate protection of USDWs. Submit this information on EPA Form 7520-14, Plugging and Abandonment Plan.

R. **NECESSARY RESOURCES** - Submit evidence such as a surety bond or financial statement to verify that the resources necessary to close, plug or abandon the well are available.

S. **AQUIFER EXEMPTIONS** - If an aquifer exemption is requested, submit data necessary to demonstrate that the aquifer meets the following criteria: (1) does not serve as a source of drinking water; (2) cannot now and will not in the future serve as a source of drinking water; and (3) the TDS content of the ground water is more than 3,000 and less than 10,000 mg/l and is not reasonably expected to supply a public water system. Data to demonstrate that the aquifer is expected to be mineral or hydrocarbon production, such as general description of the mining zone, analysis of the amenability of the mining zone to the proposed method, and time table for proposed development must also be included. For additional information on aquifer exemptions, see 40 CFR Sections 144.7 and 146.04.

T. **EXISTING EPA PERMITS** - List program and permit number of any existing EPA permits, for example, NPDES, PSD, RCRA, etc.

U. **DESCRIPTION OF BUSINESS** - Give a brief description of the nature of the business.

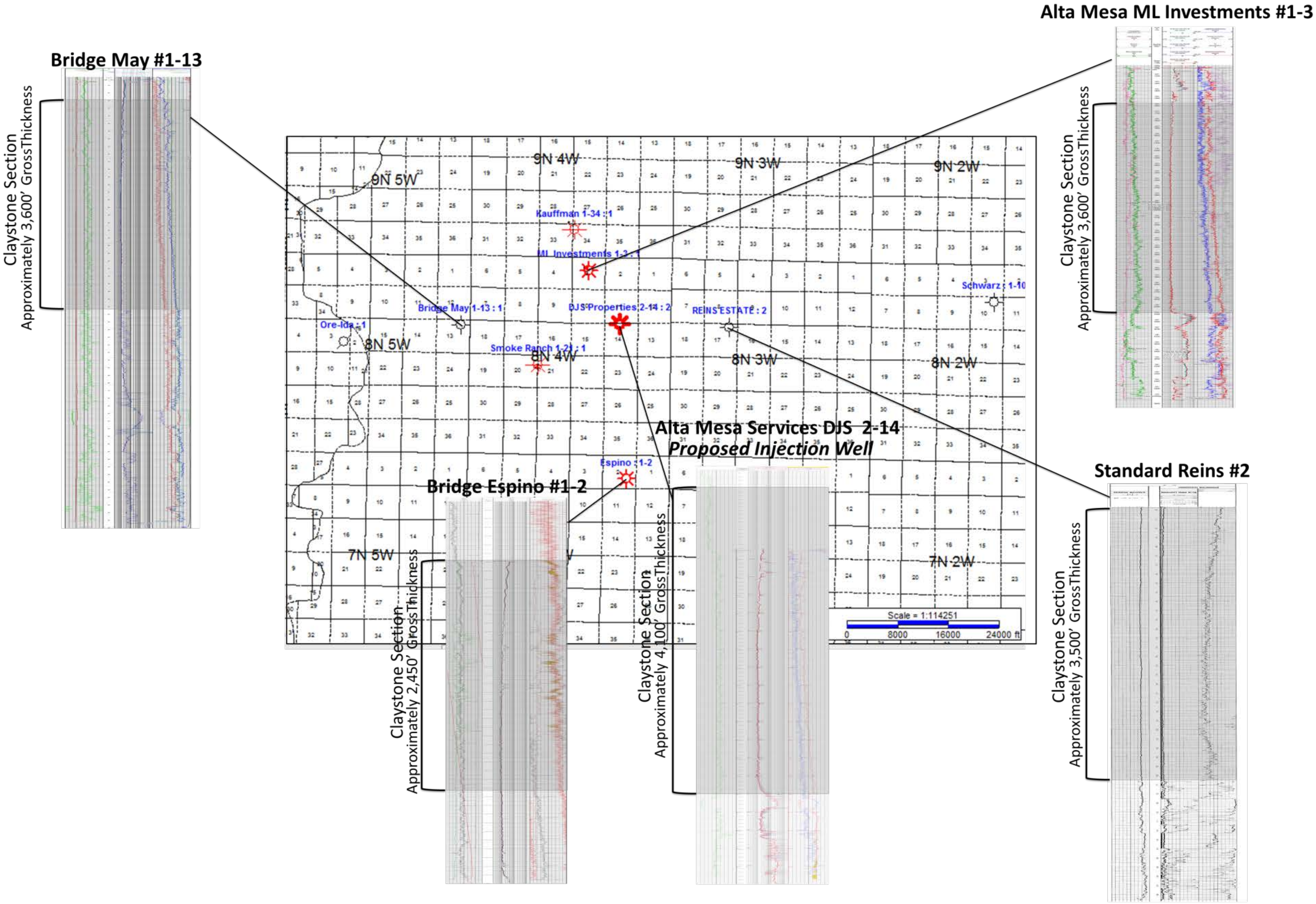
Wastewater Characteristics, EPA Methods

Alta Mesa	Date	Alkalinity (mg CaCO3/L)	Barium (mg/L)	BOD (mg?L)	Boron (mg/L)	Calcium (mg/L)	Chloride (mg/L)	COD (Mg/L)	Conductivity (µmhos/cm)	Cyanide (free) (mg/L)	Fluoride (mg/L)	Hexane extractable material (HEM) (mg/L)	Gross Alpha (pCi/L)	Gross Beta (pCi/L)	Iron (mg/L)	Manganese (mg/L)	Mercury-CVAFS (mg/L)	NO3/N (mg/L)	Potassium…(mg/L)	Radium 226 (pCi/L)	Radium 228 (pCi/L)	Methanol (mg/L)	Silica (as SiO2) (mg/L)	Silicon (mg/L)	Sodium (mg/L)	TDS (mg/L)	TSS (mg/L)	Strontium (mg/L)	Sulfate (mg/L)	MBAS (mg/L)	Turbidity (NTU)
WP4-1	March 13, 2017	525	0.315	>38.0	7.61	70.7	874	277	4320	0.0131	1.89	7.2	0.120 +/- 5.49	592 +/- 31.8	2.54	0.240	4.31	0.477		0.516 +/- 0.292	0.972 +/- 0.220	9470	50.9	23.8	404	2910	12.4	2.15	47.3	0.137	9.66
Tank Battery	May 23, 2016	419	0.144		6.93	16.1	143		1700	0.0197	7.77		0.013 +/- 1.62	20.4 +/- 4.00	2.33		0.476		40.8	0.05 +/- 0.10	-0.136 +/- 0.555	667	77.5	36.2	314	1420	15.7	0.508	9.58	0.166	48.5

Wastewater Characteristics, EPA Methods

Alta Mesa	Date	Diesel (mg/L)	Lube Oil (mg/L)	Gasoline (mg/L)	1,2,4-Trimethylbenzene (ug/L)	1,3,5-Trimethylbenzene (ug/L)	Acetone (ug/L)	Benzene (ug/L)	Ethylbenzene (ug/L)	Isopropylbenzene (ug/L)	m+p-Xylene (ug/L)	Methyl ethyl ketone (MEK) (ug/L)	Naphthalene (ug/L)	n-Propylbenzene (ug/L)	o-Xyllene (ug/L)	Toluene (ug/L)	1-Methylnaphthalene (ug/L)	2,4-Dimethylphenol (ug/L)	2-Methylnaphthalene (ug/L)	2-Mehtylphenol (ug/L)	3+4--Mehtylphenol (ug/L)	Bis(2-Ethylhexyl)phthalate (ug/L)	Fluorene (ug/L)	Naphthalene (ug/L)	Phenanthrene (ug/L)	Phenol (ug/L)	Pyrene (ug/L)
WP5-1 3:00 p.m.	March 13, 2017	438		80.2	178	103	1390	20000	657	41.4	2500	587	44.2	37.4	729	11500											
WP4-1 2:30 p.m.	March 13, 2017	43.1		71.3	182	103	1380	19400	695	40.0	2710	580	48.4	34.8	805	11100	28.4	581	57.0	1020	1590	4.24		74.1		2200	
Tank Battery	May 23, 2016	32.3	7.48	38.4	257	127	13500	24800	1080		4170		59.2		1150	17800	116	571	245	1330	1880	22.3	16.7	265	48.5	3270	21.3

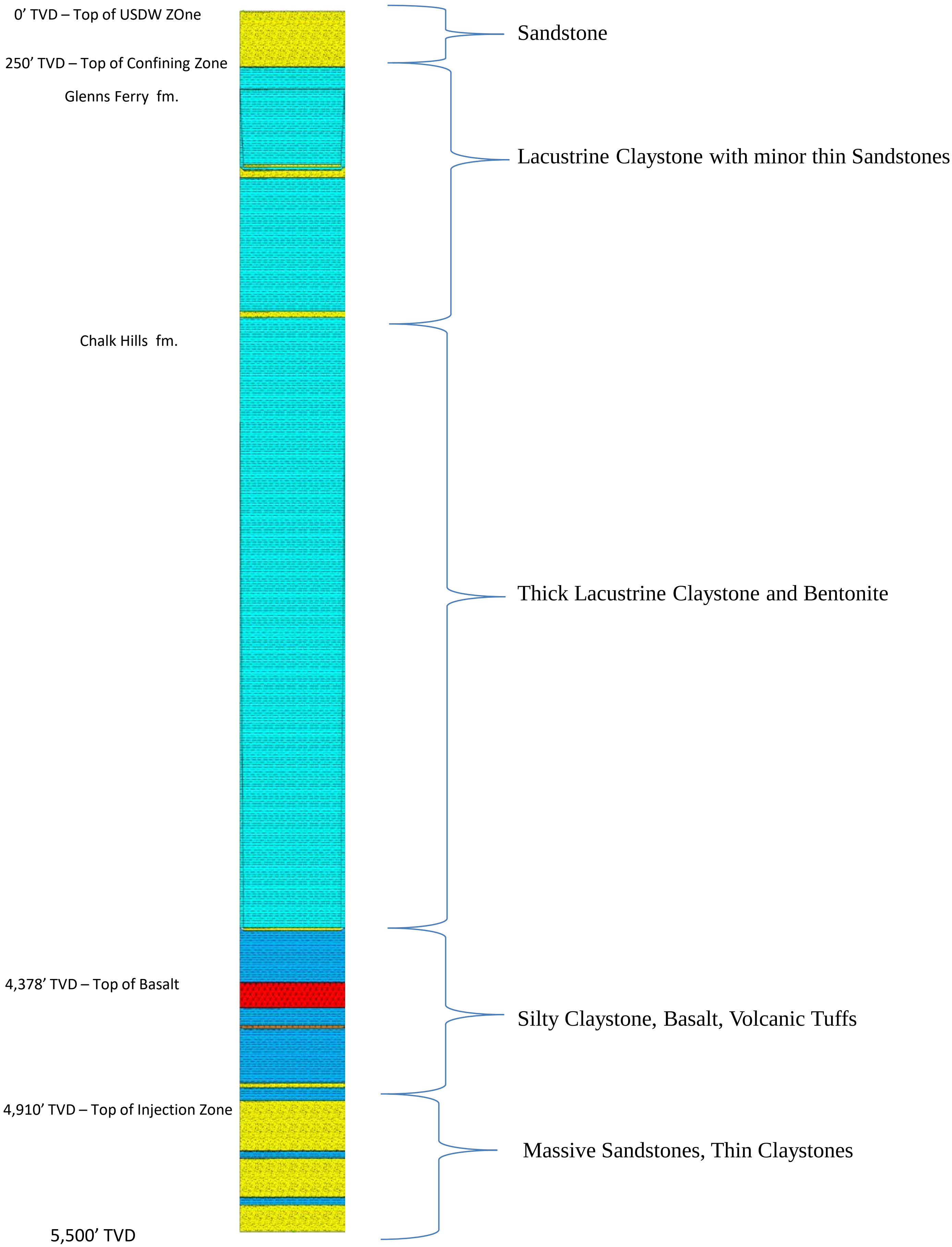
DJS 2-14 Proposed Injection Well – Regional Lacustrine Claystone Seal Map



DJS 2-14 Composite Lithological Section

Figure G-1

Descriptions



Alta Mesa Holdings **DJS Properties 2-14**

Willow Field - Payett County, ID

Current Wellbore Diagram as of 11/3/2014 - Well Temporarily Abandoned

Spud 9/12/2014 T&A'd 11/3/2014

GL Elevation above MSL: 2,488'

Casing & Cement

Conductor : 13 3/8 OD, @ 80'

Surface: 24 jts, 9-5/8" OD, 8.83 ID,40#, K-55 @ 1,082'

215 Sacks, (144 Bbls) Type III Cement + Slurrylite 50 Pps, 20% MS-500, 5% HW Gypsum, 5% Salt B.W.O.W., 0.75% TSFL-180, 0.25% CFL-300, 3.77 ft3/sk, 14.22 gal/sk, 10.4 ppg. Followed by 70 sacks, (17 Bbbls) Type III Cement + 5% Salt B.W.O.W., 1.36 ft3/sk, 6.42 gal/sk, 14.8 ppg.

Pump Top Job as Follows: Pump 116 sacks (23 Bbls) Calprem Cement + 2% Cacl2, 1.15 ft3/sk, 5 gal/sk, 15.8 ppg. Pump Top out cement @ 1.0 Bpm & 100 psi. (4 Bbls Cement to surface)

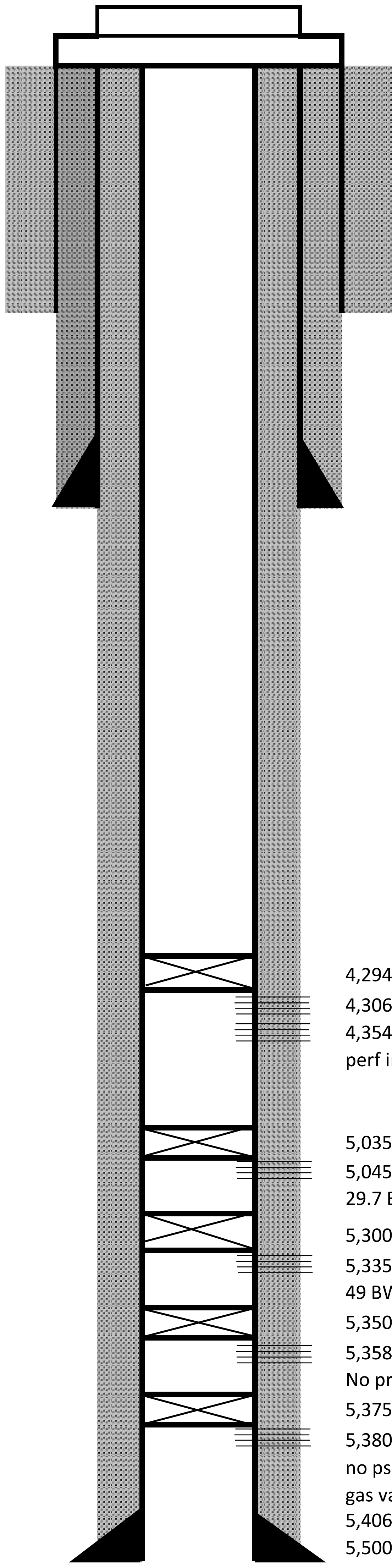
Production: 7" OD, 6.276" ID, J-55 @5.500'

Run 122 Total joints of 7", 26# J-55, LTC Casing as follows:

Float Shoe set @ 5,500', 2 Joints of Casing, Float collar set @ 5,406', 120 Joints of casing. Ran 64 Total 7" X 8 1/2" Bow Spring Centralizers, 1- Centralizer 10' above Shoe, 1- Centralizer on 1st casing Collar, 1- Centralizer 10' Below Float Collar, Centralizer on every Joint to Joint # 44 @ 3,509'. Then every 4th Joint to Joint #120 @ 80'. Centralizers Where Installed on collars on Casing Joints. Filled & circulated every 20 joints (No tight hole or problems Running Casing) (Tag with Joint #122 @ 5,500');

Cement as Follows: Pump 10 bbls of Diesel, 25 bbls of 10.0 Ppg Weighted Spacer @ 4.0 Bpm and 250 psi, Followed by 400 Sacks, (129 Bbls) TCI lite 61.6 Pps, Class G Cement, 25.9 Pps Flyash, 5.22 Pps gel, 1.82 ft3/sk, 9.72 gal/sk, 12.7 ppg. Pump Lead cement @ 3 Bpm & 340 psi. Followed by 265 Sacks, (54.7 Bbbls) Gas Seal Cement, Class G Cement, 3% Salt, 0.75% TSFL-180, 0.2% C-49, 1.16 ft3/sk, 4.9 gal/sk, 16.0 ppg. Pump Tail cement @ 3 Bpm & 239 psi. Displace with 208 Total Bbls as Follows: 152 Bbls 4% KCL Water @ 2 Bpm & 1300 Psi, (Lost Returns With 152 Bbls Displacement Away) (No Returns on last 56 Bbls) Pumped last 56 Bbls Displacement @ 1 Bpm & 3,700 Psi. (Bumped plug With 4,200 psi) Bleed off 2.5 Bbls, Check Floats, Floats Held Good. (No Spacer or Cement to Surface)

Pumped 9 cubic yards cement top-down job.



5,500' TVD

Well Name & No.: DJS Properties 2-14	Field: Willow
County: Payette	State: Idaho
Total Depth (MD): 5,500'	(TVD) 5,500'
Date Completed: T&A on 11/3/2014	Latest Revision Date: 2/3/2015

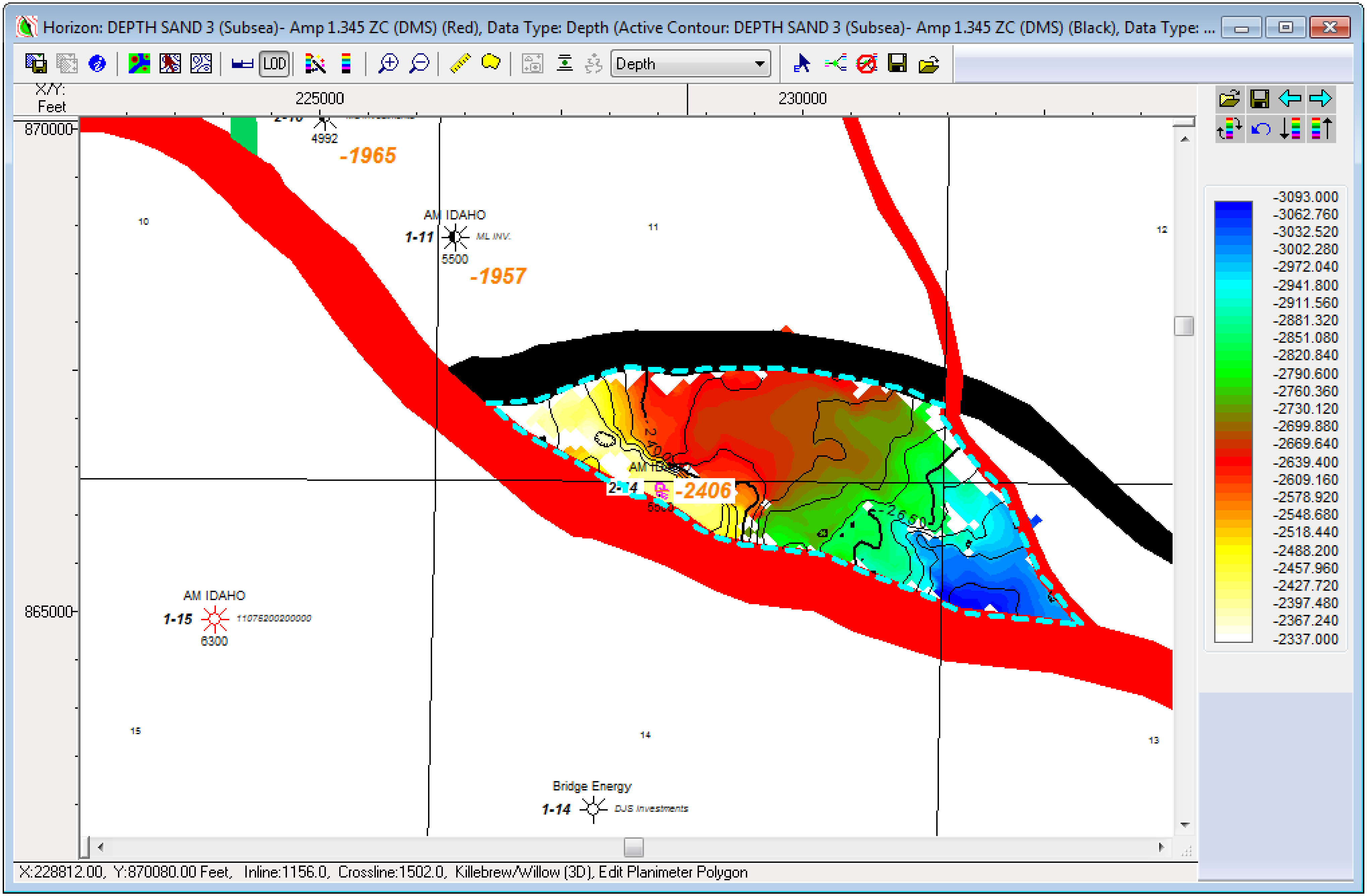
AM Idaho DJS #2-14 Proposed Disposal Well Geologic Setting

Township: 8 North - Range: 4 West - Section 14

Payette County , Idaho

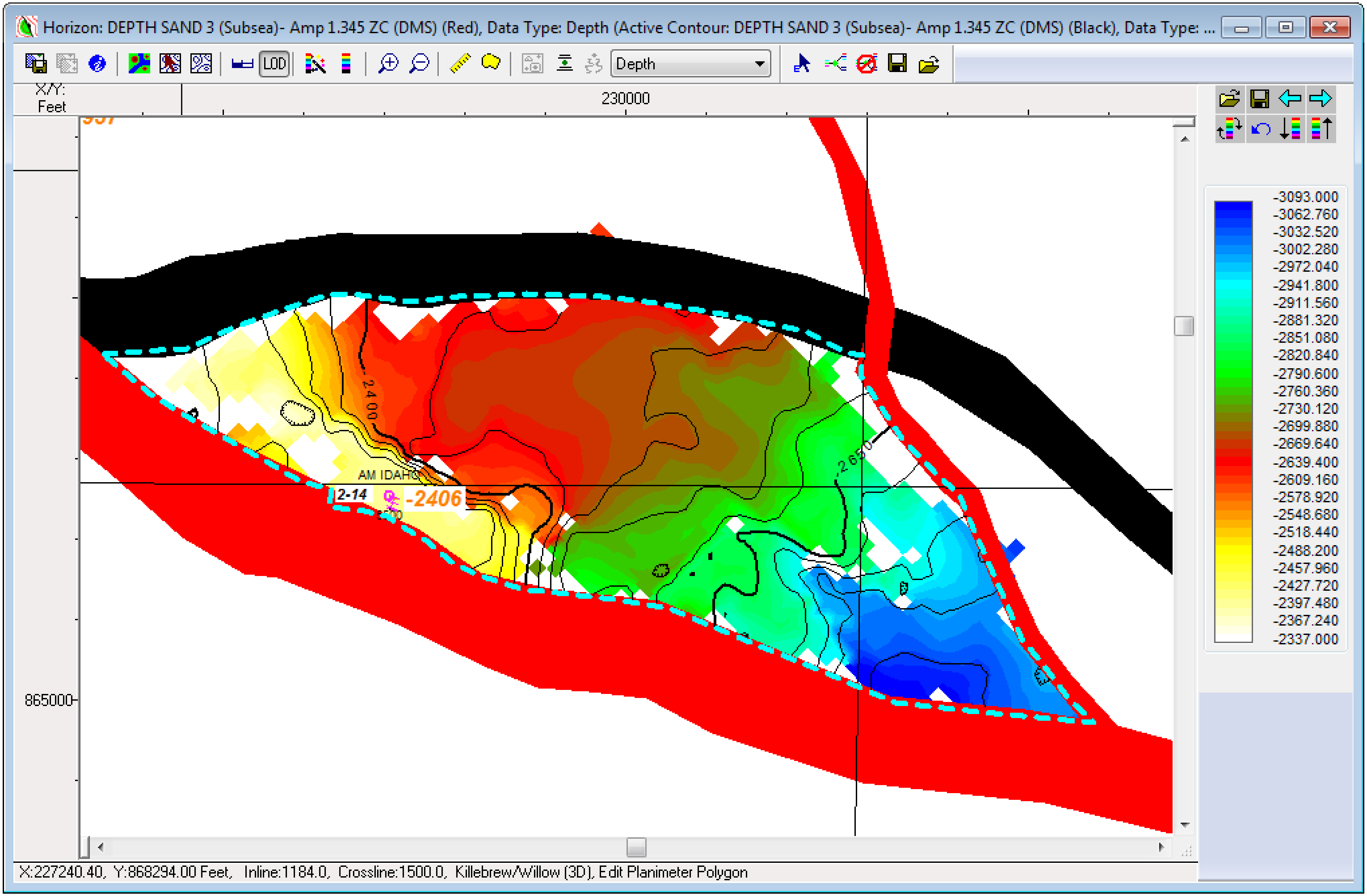
The following structure and Isopach maps were created from interpreting proprietary 3-D seismic data in conjunction with subsurface well control. Subsurface to seismic ties were done by making synthetic seismograms and verifying ties with seismic modelling. Due to the subsurface presence of basalts (very high acoustic impedance), the seismic to subsurface ties are excellent. The quality of the seismic data is very good to excellent, lending strong confidence to the interpretations Presented herein.

Structure Map (subsea): Top Sand 3
Proposed Injection Zone - Scale 1”: 1000’

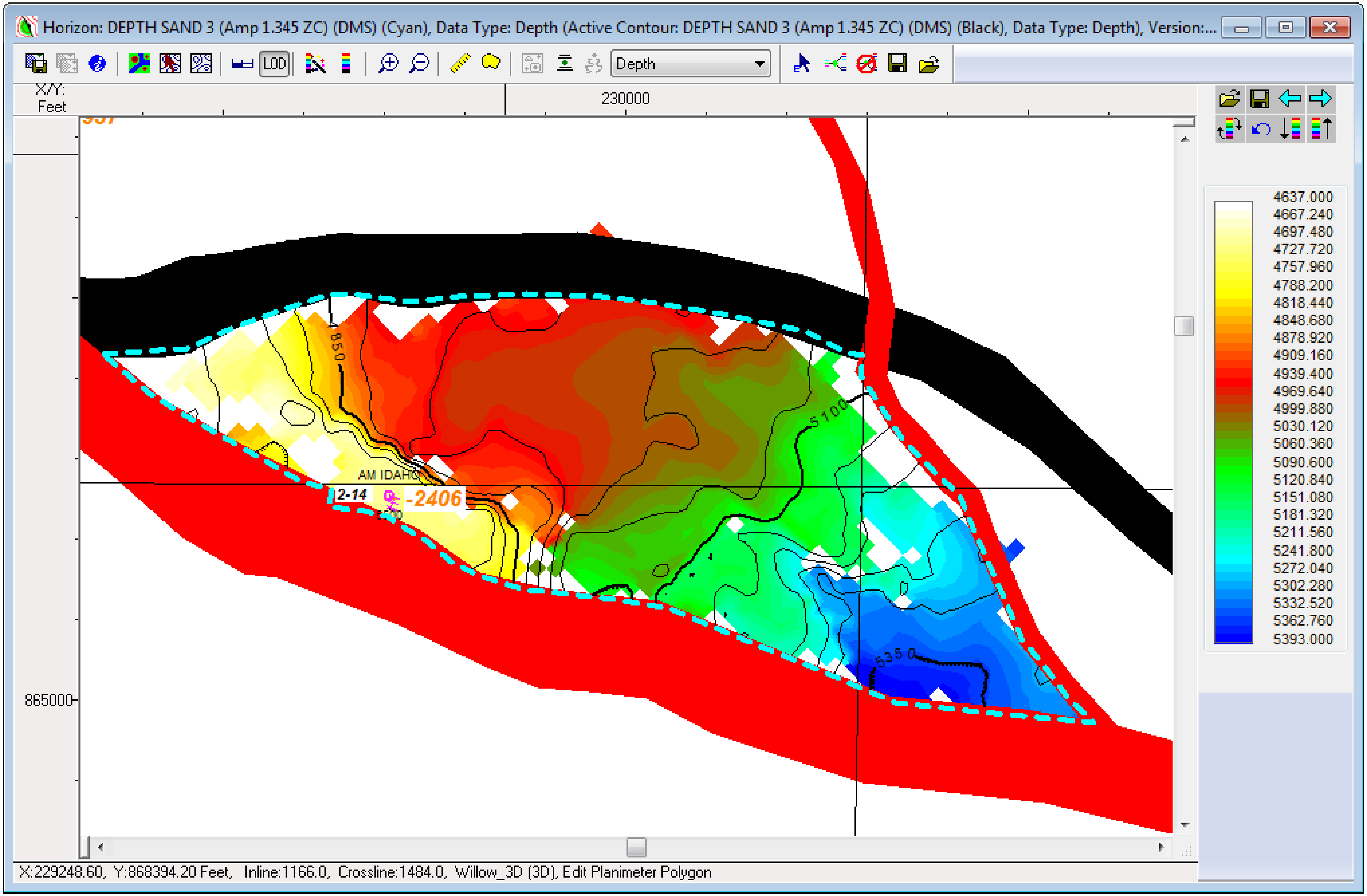


DMS 9/2017

Structure Map (subsea): Top Sand 3
Proposed Injection Zone - Scale 1”: 600’

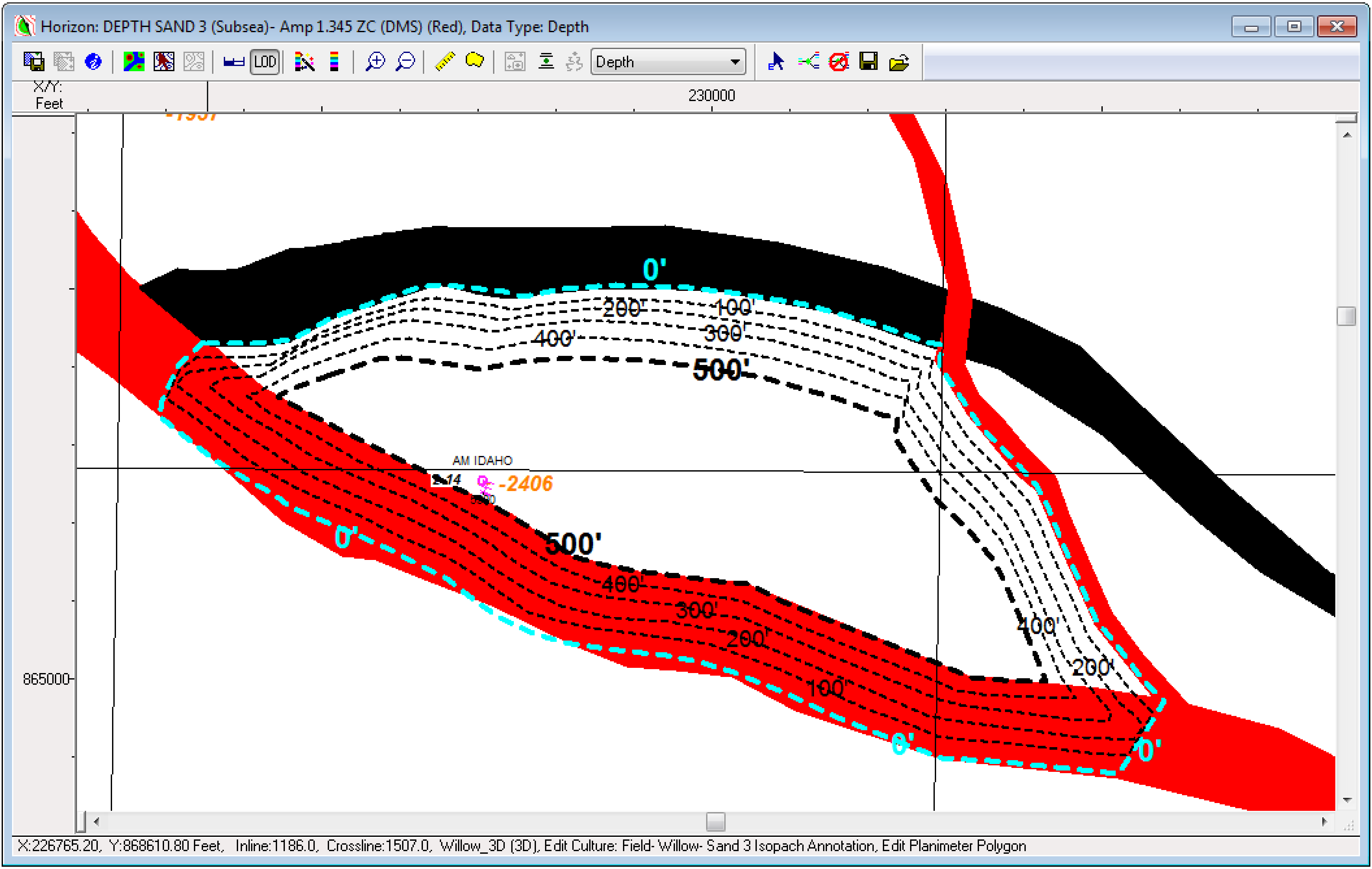


Structure Map (below Ground level datum of 2300' ASL): Top Sand 3 Proposed Injection Zone - Scale 1": 600'



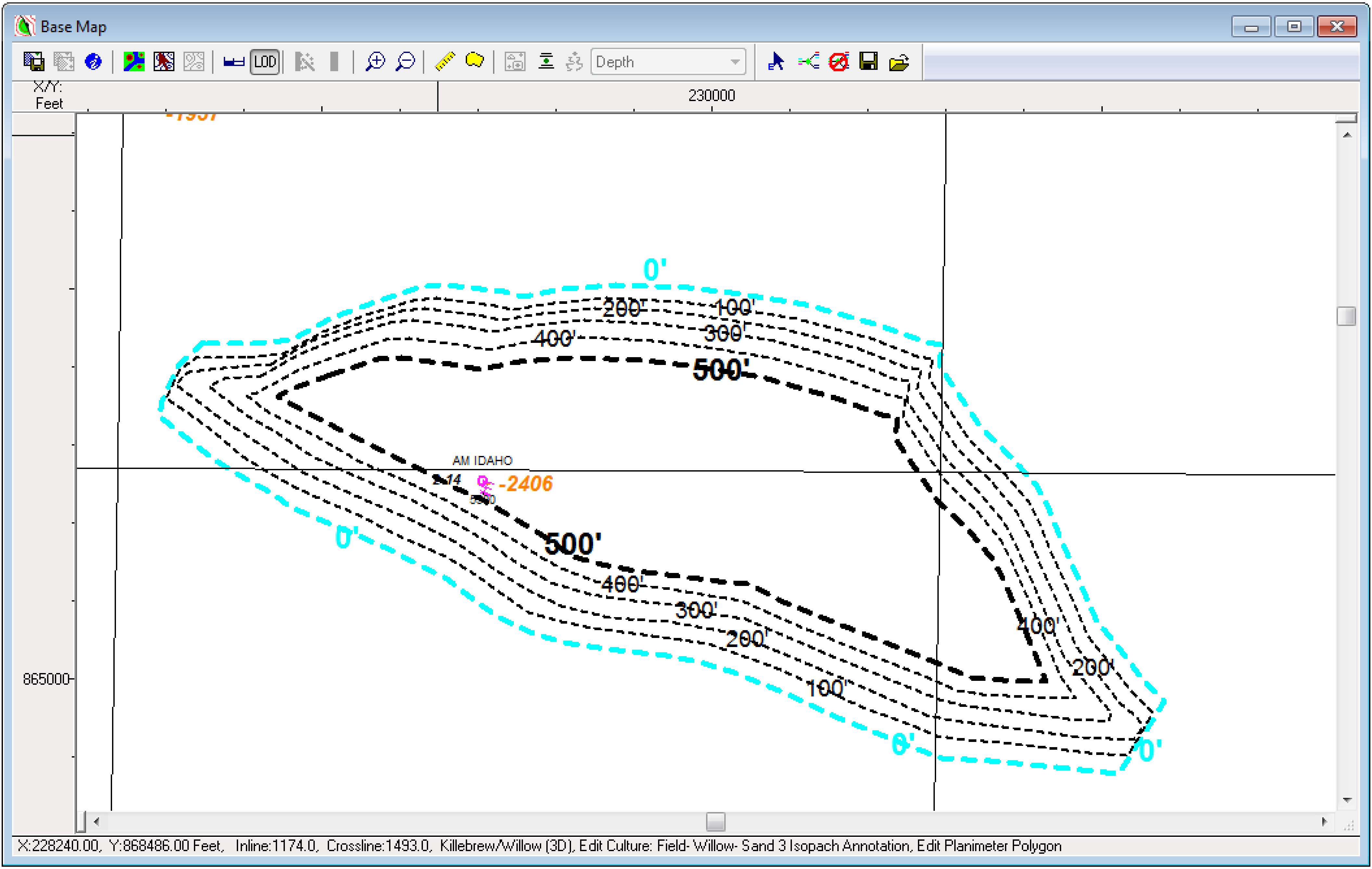
DMS 9/2017

Isopach Map of Sands 3,4,5 –showing Faulting
100' Contour Interval – Scale 1":600'



DMS 9/2017

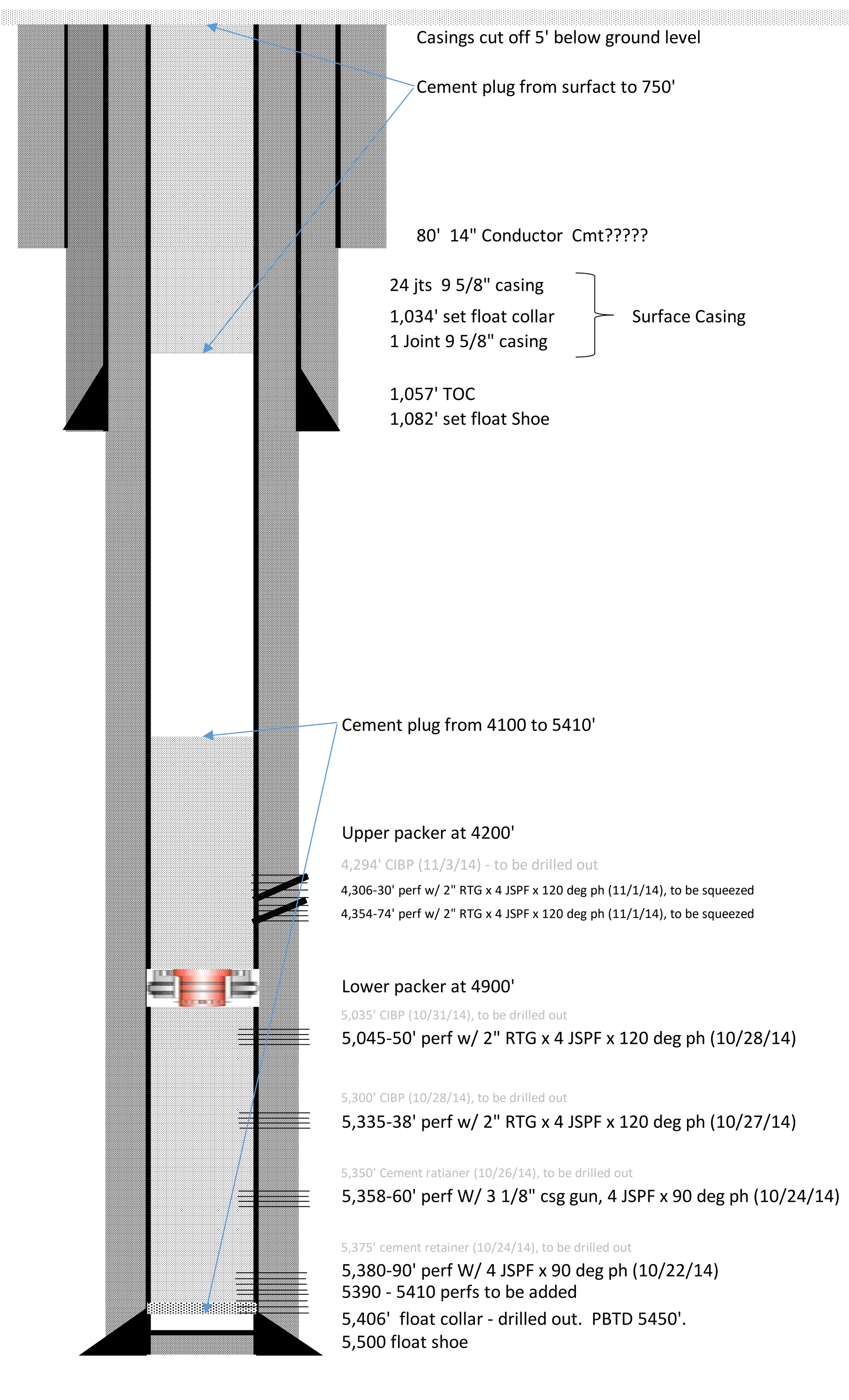
Isopach Map of Sands 3,4, & 5
Scale 1”:600’



DMS 9/2017

Alta Mesa Holdings **DJS Properties 2-14**
Willow Field - Payett County, ID
Proposed post-injection plugging configuration
Spud 9/12/2014 T&A'd 11/3/2014

GL Elevation above MSL: 2,488'



Casing & Cement

Conductor : 13 3/8 OD, @ 80'

Surface: 24 jts, 9-5/8" OD, 8.83 ID,40#, K-55 @ 1,082'
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Cement as Follows: Pump 10 bbls of Diesel, 25 bbls of 10.0 Ppg Weighted Spacer @ 4.0 Bpm and 250 psi, Followed by 400 Sacks, (129 Bbls) TCI lite 61.6 Pps, Class G Cement, 25.9 Pps Flyash, 5.22 Pps gel, 1.82 ft3/sk, 9.72 gal/sk, 12.7 ppg. Pump Lead cement @ 3 Bpm & 340 psi. Followed by 265 Sacks, (54.7 Bbbls) Gas Seal Cement, Class G Cement, 3% Salt, 0.75% TSFL-180, 0.2% C-49, 1.16 ft3/sk, 4.9 gal/sk, 16.0 ppg. Pump Tail cement @ 3 Bpm & 239 psi. Displace with 208 Total Bbls as Follows: 152 Bbls 4% KCL Water @ 2 Bpm & 1300 Psi, (Lost Returns With 152 Bbls Displacement Away) (No Returns on last 56 Bbls) Pumped last 56 Bbls Displacement @ 1 Bpm & 3,700 Psi. (Bumped plug With 4,200 psi) Bleed off 2.5 Bbls, Check Floats, Floats Held Good. (No Spacer or Cement to Surface)

Pumped 9 cubic yards cement top down surface job.

Well Name & No.: DJS Properties 2-14	Field: Willow
County: Payette	State: Idaho
Total Depth (MD): 5,500'	(TVD) 5,500'
Date Completed: T&A on 11/3/2014	Latest Revision Date: 2/3/2015

Alta Mesa Holdings **DJS Properties 2-14**
Willow Field - Payett County, ID
Proposed Injection Completion Configuration
Spud 9/12/2014 T&A'd 11/3/2014

GL Elevation above MSL: 2,488'

Casing & Cement
Conductor : 13 3/8 OD, @ 80'

Surface: 24 jts, 9-5/8" OD, 8.83 ID,40#, K-55 @ 1,082'
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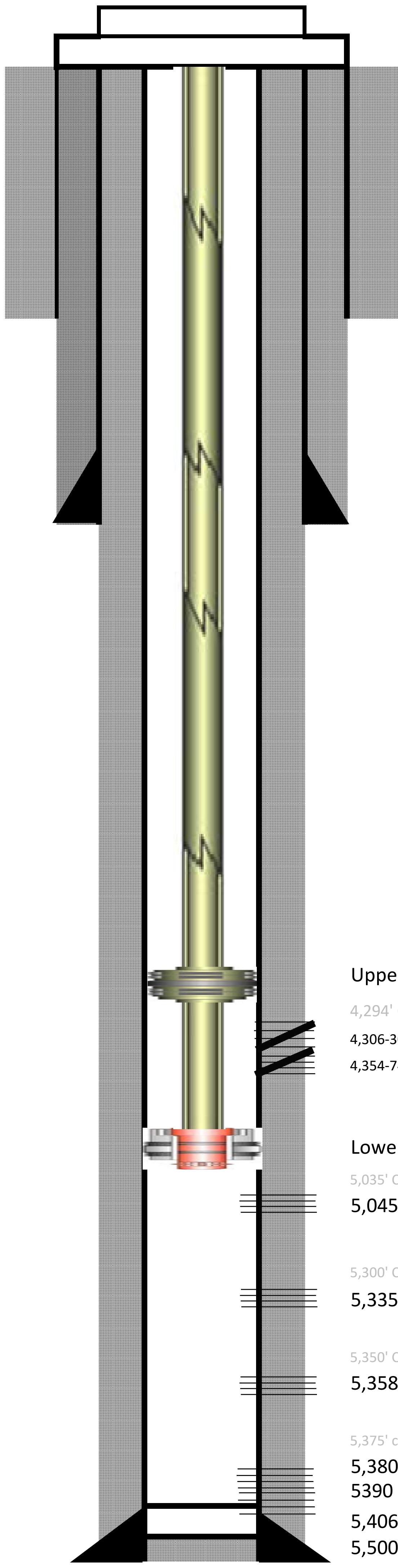
Pumped 9 cubic yards cement top down surface job.



Well Name & No.: DJS Properties 2-14	Field: Willow
County: Payette	State: Idaho
Total Depth (MD): 5,500'	(TVD) 5,500'
Date Completed: T&A on 11/3/2014	Latest Revision Date: 2/3/2015

Calculation of Confined Injection Zone Capacity

DJS Properties #2-14 Injection Zone

Calculation of Reservoir Volumes:

Porosity	0.23	fraction	from well log
Sw	0.80	fraction	water saturation - evidence of gas in swab testing and water analysis
Sg	0.20	fraction	gas saturation - evidence of gas in zone from swab testing - residual gas
Gross Volume	94,700	acre-ft	from planimetry calculations below
Net/Gross Ratio	0.90	fraction	from well logs
Pore Volume	19,603	acre-ft	

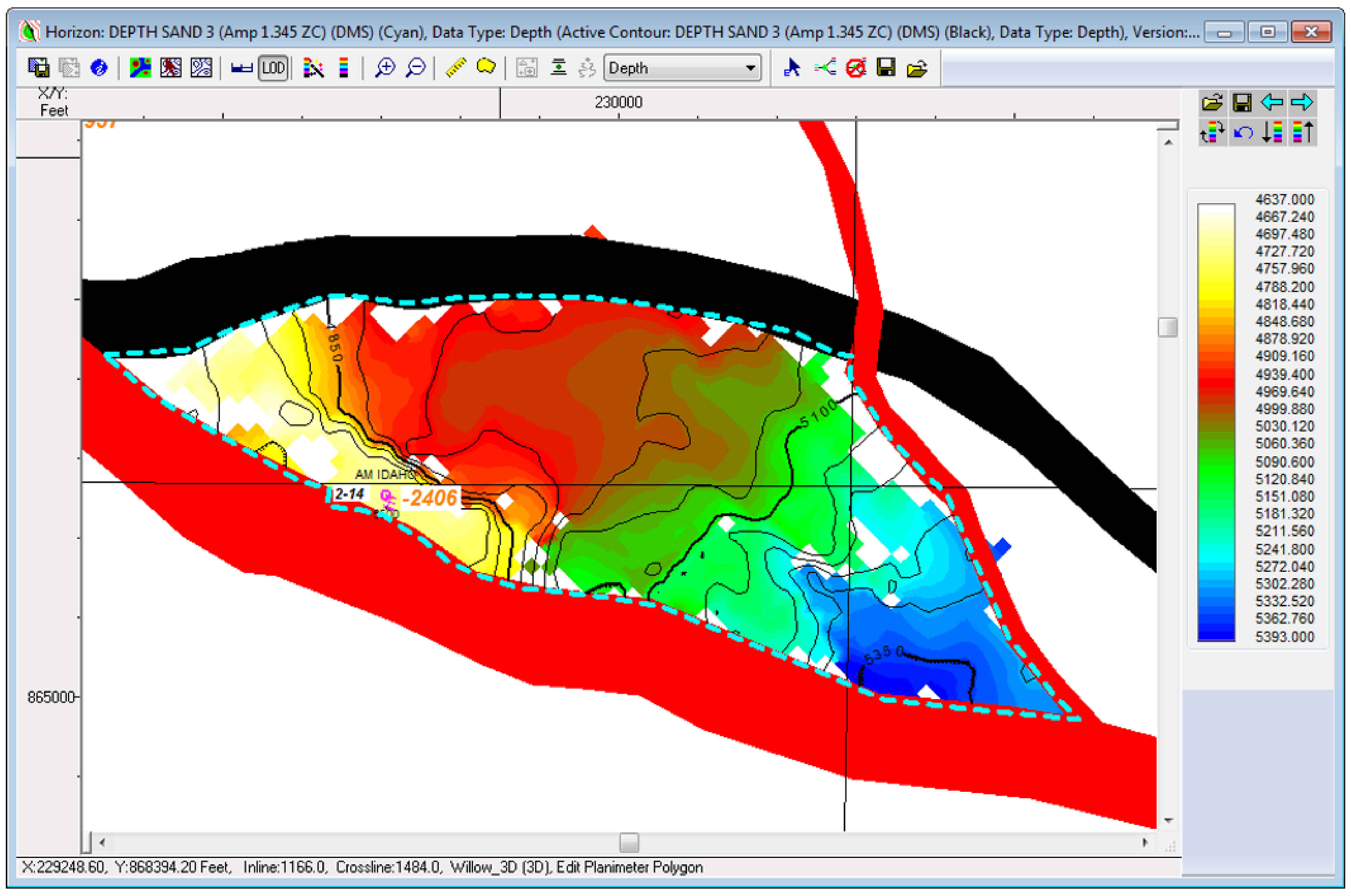
Reservoir Isopach Area Planimeter Readings:

CONTOUR LINE VALUE	AREA > (acres)	RATIO OF AREAS	DELTA CONTOUR (ft)	DELTA VOLUME (acre-ft)	
0	269.00				
100	234.00	0.8699	100	25,150.0	
200	205.00	0.8761	100	21,950.0	
300	173.00	0.8439	100	18,900.0	
400	144.00	0.8324	100	15,850.0	
500	113.00	0.7847	100	12,850.0	
		TOTAL ==>		94,700.0	acre-ft - gross bulk reservoir volume

Injection Zone Capacity

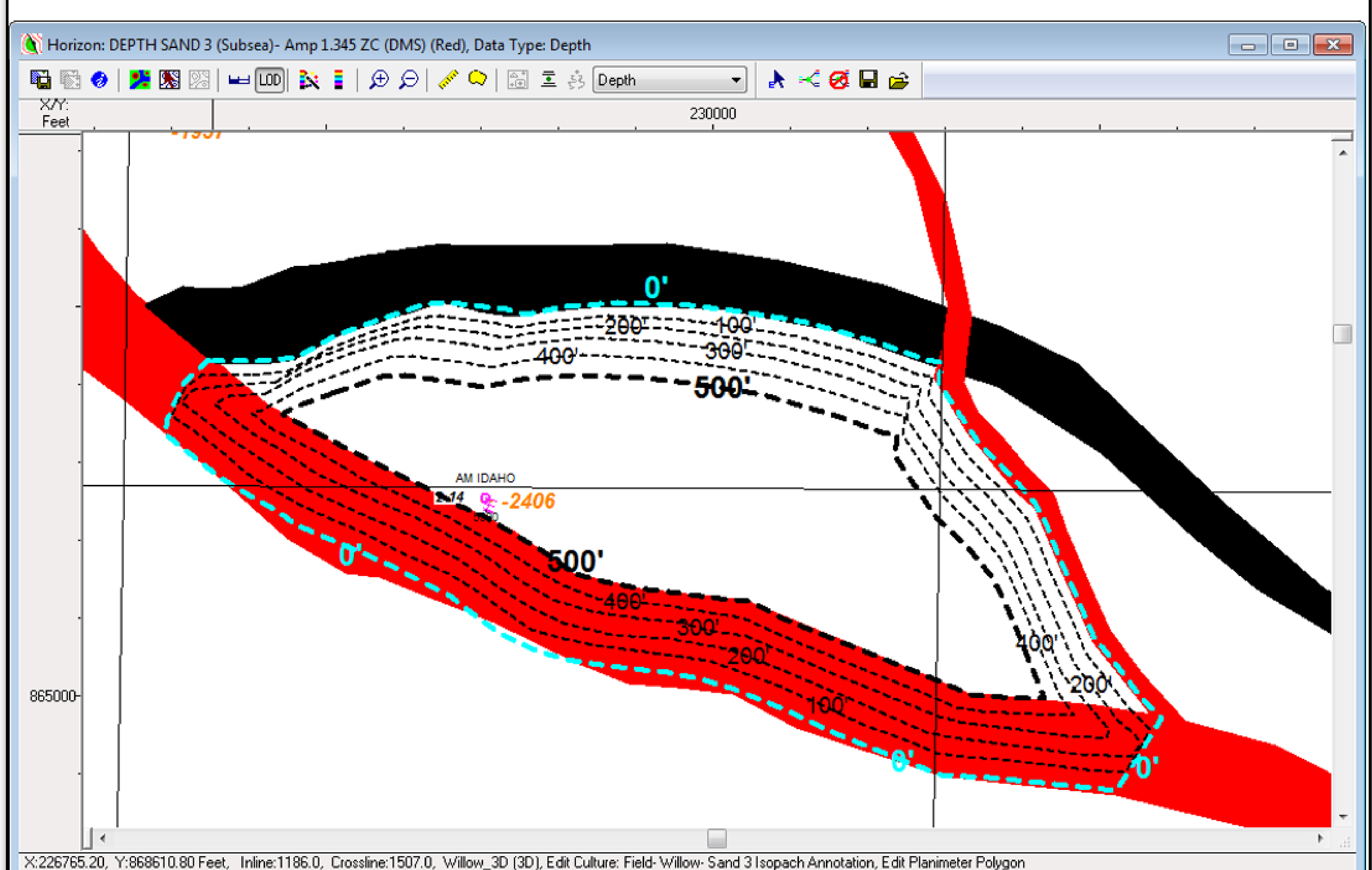
Item	**Value**	**Units**	**Comments - notes**
Datum Depth:	5150	ft, BGL	average depth of injection zone
Average Temperature	251	deg F	ML Investments 1-3 production log
Initial Pressure:	2276	psi	8.6 ppg equivalent pore pressure at datum depth
Fracture Pressure:	3214	psi	12 ppg equivalent pore pressure at datum depth
Maximum Allowable Pressure	2892	psi	90% of fracture pressure
Maximum Pressure Increase (dP)	616	psi	maximum allowable pressure less initial pressure
Average Pressure	2584	psi	average of initial pressure and maximum allowable pressure
Water Salinity	750	ppm Cl	estimated average
Water Compressibility	3.48E-06	1/psi	Osif's Correlation
Gas Compressibility	3.87E-04	1/psi	Meehan et al, Gas gravity = 0.65 from ML Investments 1-10 Well
Rock pore volume compressibility	3.50E-06	1/PSI	Hall's Correlation
Reservoir Water Volume Initial	15,682	acre-ft	Pore Volume * Sw
Reservoir Water Volume Initial	121,663,439	RBbls	Pore Volume * Sw
Reservoir Water Volume Compression	261,022	RBbls	dP * water compressibility* initial water volume
Reservoir Gas Space Volume Initial	3,921	acre-ft	Pore Volume * Sg
Reservoir Gas Space Volume Initial	30,415,860	RBbls	Pore Volume * Sg
Gas Pore Space Compression	7,250,191	RBbls	dP * gas compressibility * initial gas volume
Pore Space Volume Increase	262,281	Rbbls	dP * pore space compressibility
Total Pore Space volume increase	7,773,494	RBbls	sum of water, gas, and pore space compression
Bw (water formation volume factor):	1.055	RBbl/STBbl	McCain's Correlation
Total Stock Tank Barrels Capacity	**7,368,241**	**STBbls**	adjust to surface conditions by dividing by water formation volume factor (Bw)

Structure Map (below Ground level datum of 2300' ASL): Top Sand 3
Proposed Injection Zone - Scale 1": 600'



DMS 9/2017

Isopach Map of Sands 3,4,5 –showing Faulting
100' Contour Interval – Scale 1":600'



DMS 9/2017

Reply Reply All Forward IM
Wed 9/20/2017 12:07 PM

David M. Smith

RE: Geologic support for proposed injection well DJS #2-14

To Dale R. Hayes; Mofazzal Bhuiyan; Michael Christian
Cc Mike H. McMennamy

Conversation Filer TeamViewer + Get more add

I can have Karl Planimeter a hard copy to calculate gross volumes using different methods.

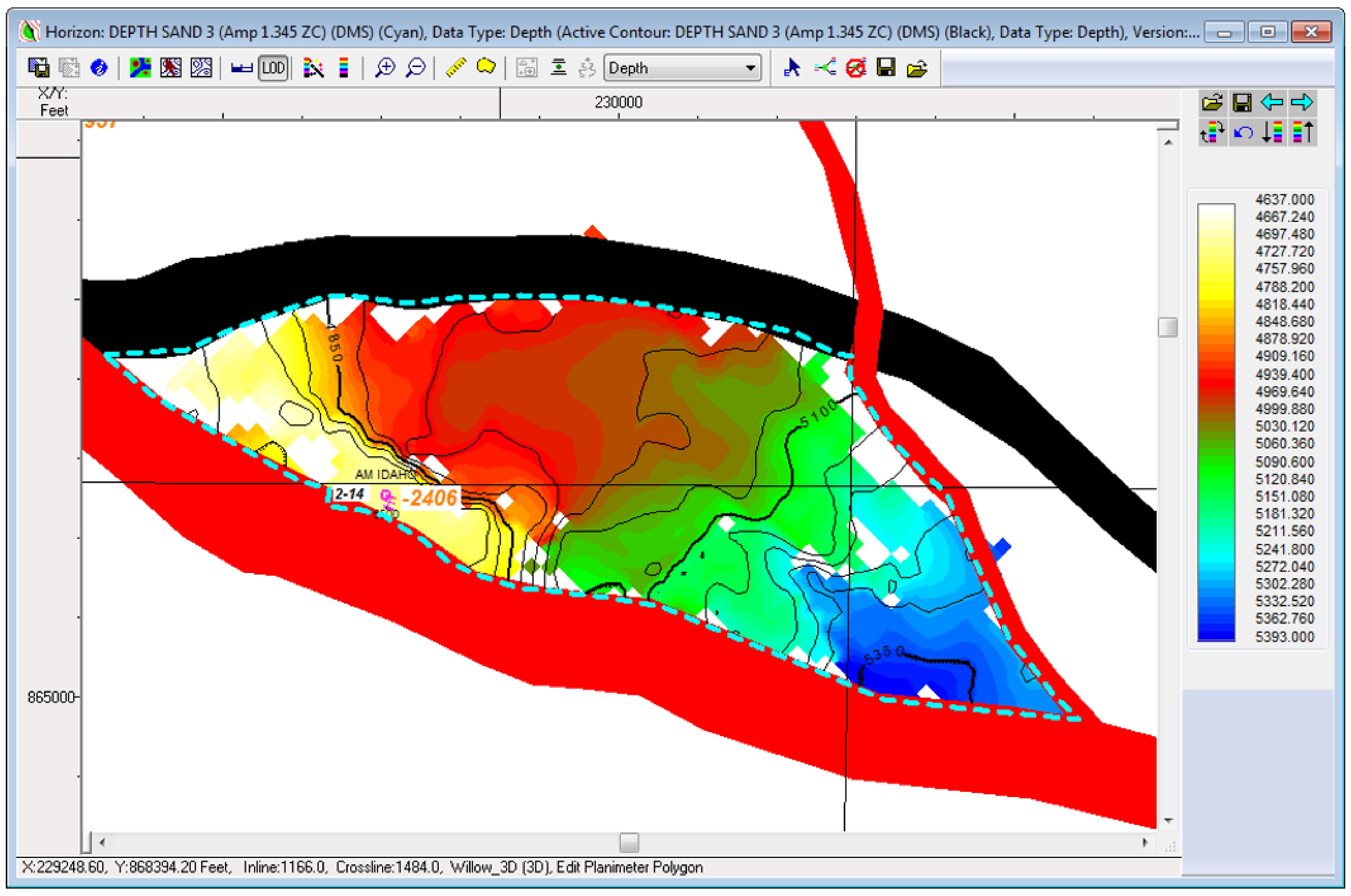
Areas are:

0' contour – 269 acres
100' - 234 ac.
200' – 205 ac.
300' – 173 ac.
400' – 144 ac.
500' – 113 ac.

The volume should be the same as **500' x 188 acres = 94,000 ac. ft.**

Regards,
Dave

Structure Map (below Ground level datum of 2300' ASL): Top Sand 3
Proposed Injection Zone - Scale 1": 600'



DMS 9/2017

Isopach Map of Sands 3,4,5 –showing Faulting
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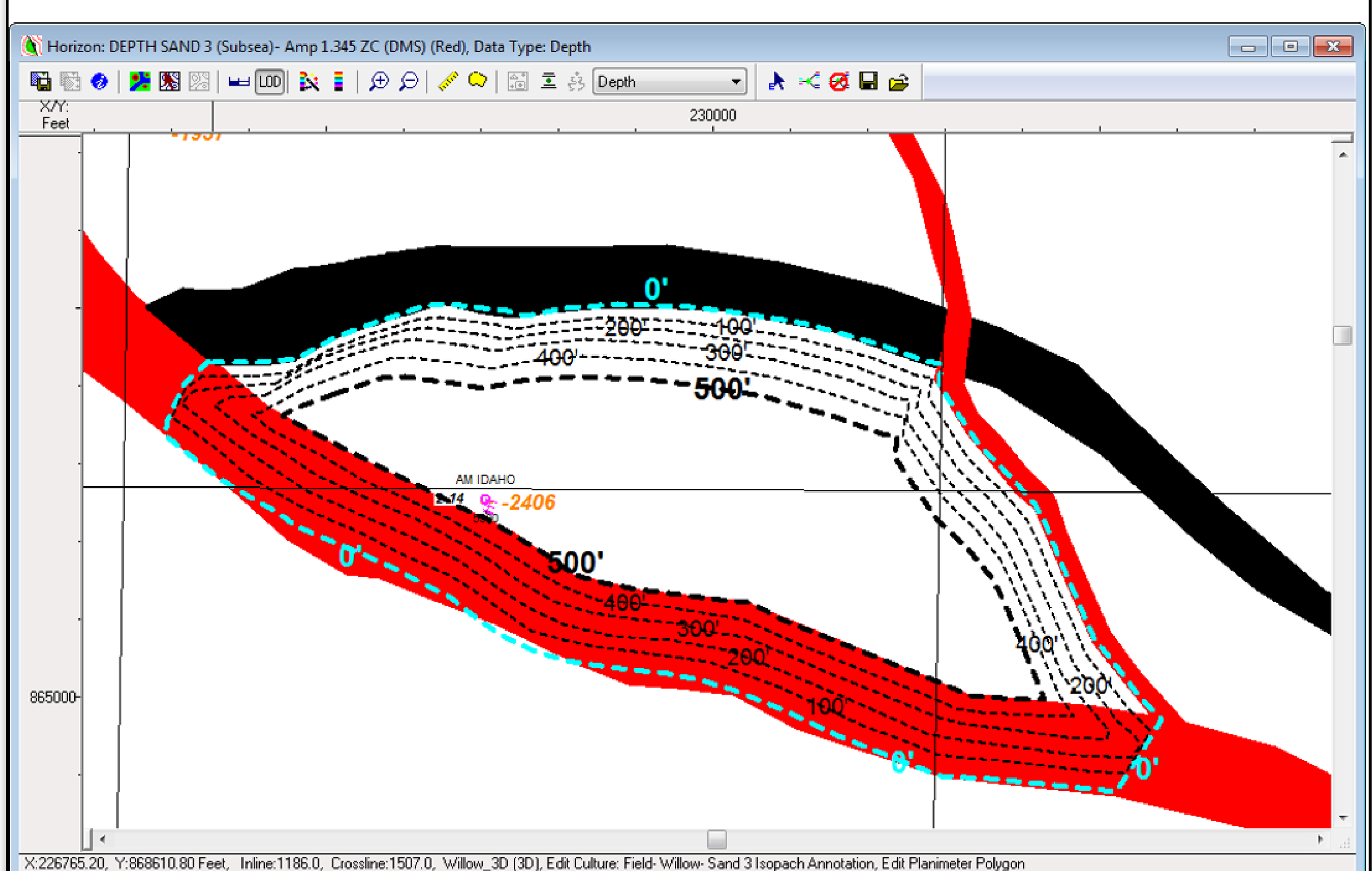

DMS 9/2017

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500' – 113 ac.

The volume should be the same as **500' x 188 acres = 94,000 ac. ft.**

Regards,
Dave

From:	Contreras, Peter
To:	Werntz, James; Kenney, James
Cc:	Osborne, Evan; Bellovary, Chris
Subject:	FW: Injection Well Application
Date:	Friday, August 18, 2017 8:49:24 AM

FYI.

Peter Contreras | Ground Water Unit | EPA Region 10 Seattle | 206 553 6708

From: Contreras, Peter
Sent: Friday, August 18, 2017 8:48 AM
To: 'Michael Christian' <mchristian@mch-lawyer.com>; Richard Brown <richard@weiserbrown.email>
Cc: Ronda Louderman <rlouderman@AltaMesa.net>; Dale R. Hayes <dhayes@AltaMesa.net>; David Pepper <dpepper@AltaMesa.net>
Subject: RE: Injection Well Application

Thanks for the update. Have a good weekend.

Peter Contreras | Ground Water Unit | EPA Region 10 Seattle | 206 553 6708

From: Michael Christian [mailto:mchristian@mch-lawyer.com]
Sent: Friday, August 18, 2017 8:43 AM
To: Richard Brown <richard@weiserbrown.email>; Contreras, Peter <Contreras.Peter@epa.gov>
Cc: Ronda Louderman <rlouderman@AltaMesa.net>; Dale R. Hayes <dhayes@AltaMesa.net>; David Pepper <dpepper@AltaMesa.net>
Subject: RE: Injection Well Application

Peter, the landowner on whose land the candidate wells are located has requested that we use a different well than we originally anticipated. As a consequence, we need to go back and rework our permit application materials a little. We are working on that as rapidly as we can, and I'm hopeful we can complete that by end of next week.

Thanks,
Mike

Michael Christian
Marcus, Christian, Hardee & Davies LLP
737 N. 7th St.
Boise, ID 83702
(208) 342-3563
(208) 342-2170 (fax)

From: Richard Brown [mailto:richard@weiserbrown.email]
Sent: Thursday, August 17, 2017 12:29 PM
To: Contreras, Peter
Cc: Ronda Louderman; Dale R. Hayes; Michael Christian
Subject: Re: Injection Well Application

Peter -I appreciate the heads up -I know Ronda had forwarded it to our attorney for a last review - hopefully it got out the door to you in the last couple of days but I'm verifying with Michael?

Sent from my iPhone

On Aug 17, 2017, at 12:22 PM, Contreras, Peter <Contreras.Peter@epa.gov> wrote:

> Hi Richard,
>
> I wanted to confirm your time line and our last communications before I head out of the office on some vacation and work travel for the remainder of the month.
>
> I haven't received a permit application yet and you indicated one might be coming soon. I wanted to be sure something didn't get lost or miscommunicated. EPA is continuing to coordinate with Idaho. We expect a response from IDWR to our last letter dated July 28, 2017, to determine what role EPA will have in supporting oil and gas activities in Idaho. My understanding is our attorney was going to share a copy of EPA's letter with Michael Christian for your information, but if that didn't happen for any reason, let me know, and I can forward a copy to you directly.
>
> Thanks,
>
> Peter
>
> Peter Contreras | Ground Water Unit | EPA Region 10 Seattle | 206 553 6708
>
> ---
>
> **From:** Richard Brown [mailto:richard@weiserbrown.email]
> **Sent:** Tuesday, August 08, 2017 12:57 PM
> **To:** Contreras, Peter <Contreras.Peter@epa.gov>
> **Cc:** Ronda Louderman <rlouderman@AltaMesa.net>; Dale R. Hayes <dhayes@AltaMesa.net>
> **Subject:** RE: Injection Well Application

Thanks Peter

Richard Brown, Weiser-Brown Oil Co.
Snake River Oil and Gas LLC
Cell/Office 713-818-6856
RB-WeiserBrown@comcast.net

From: Contreras, Peter [mailto:Contreras.Peter@epa.gov]
Sent: Tuesday, August 08, 2017 2:11 PM
To: Richard Brown <richard@weiserbrown.email>
Cc: Michael Christian <mchristian@mch-lawyer.com>; Ronda Louderman <rlouderman@AltaMesa.net>; Dale R. Hayes <dhayes@AltaMesa.net>; Werntz, James <Werntz.James@epa.gov>; Kenney, James <Kenney.James@epa.gov>; Bellovary, Chris <Bellovary.Chris@epa.gov>; Steiner-Riley, Cara <Steiner-Riley.Cara@epa.gov>
Subject: RE: Injection Well Application

Hi Richard, My direct mailing address is:

Peter Contreras, Manager
Ground Water Unit
US EPA, Region 10
1200 Sixth Avenue, Mail Stop: OCE-101
Seattle, WA 98101

Thanks,

Peter

Peter Contreras | Ground Water Unit | EPA Region 10 Seattle | 206 553 6708

From: Richard Brown [mailto:richard@weiserbrown.email]
Sent: Tuesday, August 08, 2017 11:20 AM
To: Contreras, Peter <Contreras.Peter@epa.gov>
Cc: Michael Christian <mchristian@mch-lawyer.com>; Ronda Louderman <rlouderman@AltaMesa.net>; Dale R. Hayes <dhayes@AltaMesa.net>; Werntz, James <Werntz.James@epa.gov>; Kenney, James <Kenney.James@epa.gov>; Bellovary, Chris <Bellovary.Chris@epa.gov>; Steiner-Riley, Cara <Steiner-Riley.Cara@epa.gov>
Subject: RE: Injection Well Application

Peter-Our finalized permit application is being reviewed internally and should go out in next 24-48 hours. What is your direct address and is it different if we send the application via FED EX? Thanks-Richard

Richard Brown, Weiser-Brown Oil Co.
Snake River Oil and Gas LLC

Cell/Office 713-818-6856
RB-WeiserBrown@comcast.net

From: Contreras, Peter [mailto:Contreras.Peter@epa.gov]
Sent: Friday, July 28, 2017 1:07 PM
To: Richard Brown <richard@weiserbrown.email>
Cc: Michael Christian <mchristian@mch-lawyer.com>; Ronda Louderman <rlouderman@AltaMesa.net>; Dale R. Hayes <dhayes@AltaMesa.net>; Werntz, James <Werntz.James@epa.gov>; Kenney, James <Kenney.James@epa.gov>; Bellovary, Chris <Bellovary.Chris@epa.gov>; Steiner-Riley, Cara <Steiner-Riley.Cara@epa.gov>
Subject: RE: Injection Well Application

Richard,

Thank you for your email. I am copying Chris Bellovary, in our Office of Regional Counsel. Chris was the one who communicated previously with Mr. Christian.

If you send any permit application to EPA, you can send it to my attention. I will work with others at EPA and Idaho to coordinate the review, as we are able. EPA is continuing to coordinate with Idaho state staff on how we can support this effort.

Regards,

Peter

Peter Contreras | Ground Water Unit | EPA Region 10 Seattle | 206 553 6708

From: Richard Brown [mailto:richard@weiserbrown.email]
Sent: Friday, July 28, 2017 10:15 AM
To: Contreras, Peter <Contreras.Peter@epa.gov>
Cc: Michael Christian <mchristian@mch-lawyer.com>; Ronda Louderman <rlouderman@AltaMesa.net>; Dale R. Hayes <dhayes@AltaMesa.net>; Werntz, James <Werntz.James@epa.gov>; Kenney, James <Kenney.James@epa.gov>
Subject: Injection Well Application

Peter- Thanks for the time yesterday. Per our conversation and after more thorough review, we are of the position that the ban in Idaho no longer exists and is not an issue. The ban was imposed in 1985 and pertained to all classes of injection wells other than Class V. It was countermanded in 2013 when the state rules were re-written and approved by the legislature. The current rules as re-written in 2013 include all the details of a Class II program and no "ban". As to the aquifer reclassification issue and DEQ, we are reviewing the best and most expeditious remedy and will be meeting with DEQ shortly. As I mentioned, my partners at Alta Mesa will be submitting our injection

well application within 7-10 days. I'm copying our attorney Michael Christian who you met at the Boise meeting. As you mentioned, Michael has had conversation with your attorney in Seattle. I don't think they have conversed since we researched the re-written rules and their effect on the "ban". I have also copied Mrs. Ronda Louderman with Alta Mesa. Ronda is in charge of regulatory affairs at Alta Mesa and is the one preparing the application. I believe Alta Mesa has filed a recent injection application with the EPA and it was in Florida. I'll let Ronda confirm. I think she is quite knowledgeable in this arena. I'm also copying Dale Hayes. Dale is the head engineer at Alta Mesa and would have engineering oversight over the injection well. Regards-
Richard

Richard Brown, Weiser-Brown Oil Co.
Snake River Oil and Gas LLC
Cell/Office 713-818-6856
RB-WeiserBrown@comcast.net

From:	Michael Christian
To:	Osborne, Evan; Thurmon, Clarke
Subject:	Class II UIC permit application
Date:	Tuesday, September 11, 2018 7:10:22 AM
Attachments:	EPA Class II Injection Permit Attachments_Edited_9.10.18.docx l-barry burnell.2.1.18.pdf Exhibit A.xlsx Exhibit B Part 1.pdf Exhibit B Part 2.pdf Exhibit B Part 3.pdf Exhibit C.pdf Exhibit D.pptx Exhibit E.pdf Exhibit F.pdf Exhibit G.pdf l-osborne.9.11.18.pdf

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Evan, Clarke:

Attached are:

1. A letter to you describing the additional information being submitted in support of my client's Class II permit application, and including a longer discussion of the aquifer exemption request;
2. A modified version of Attachments A-U, to replace the previous set of attachments provided to you;
3. A copy of a February 1, 2018 letter from me to Barry Burnell of the Idaho Department of Environmental Quality, discussing facts supporting aquifer exemption; and
4. Copies of the attachments referenced in the IDEQ letter.

Please let me know if you have any questions about any of the above.

Thanks,
Mike

Michael Christian
MARCUS, CHRISTIAN, HARDEE & DAVIES, LLP
737 N. 7th Street
Boise, ID 83702
(208) 342-3563
mchristian@mch-lawyer.com

EPA CLASS II INJECTION WELL PERMIT

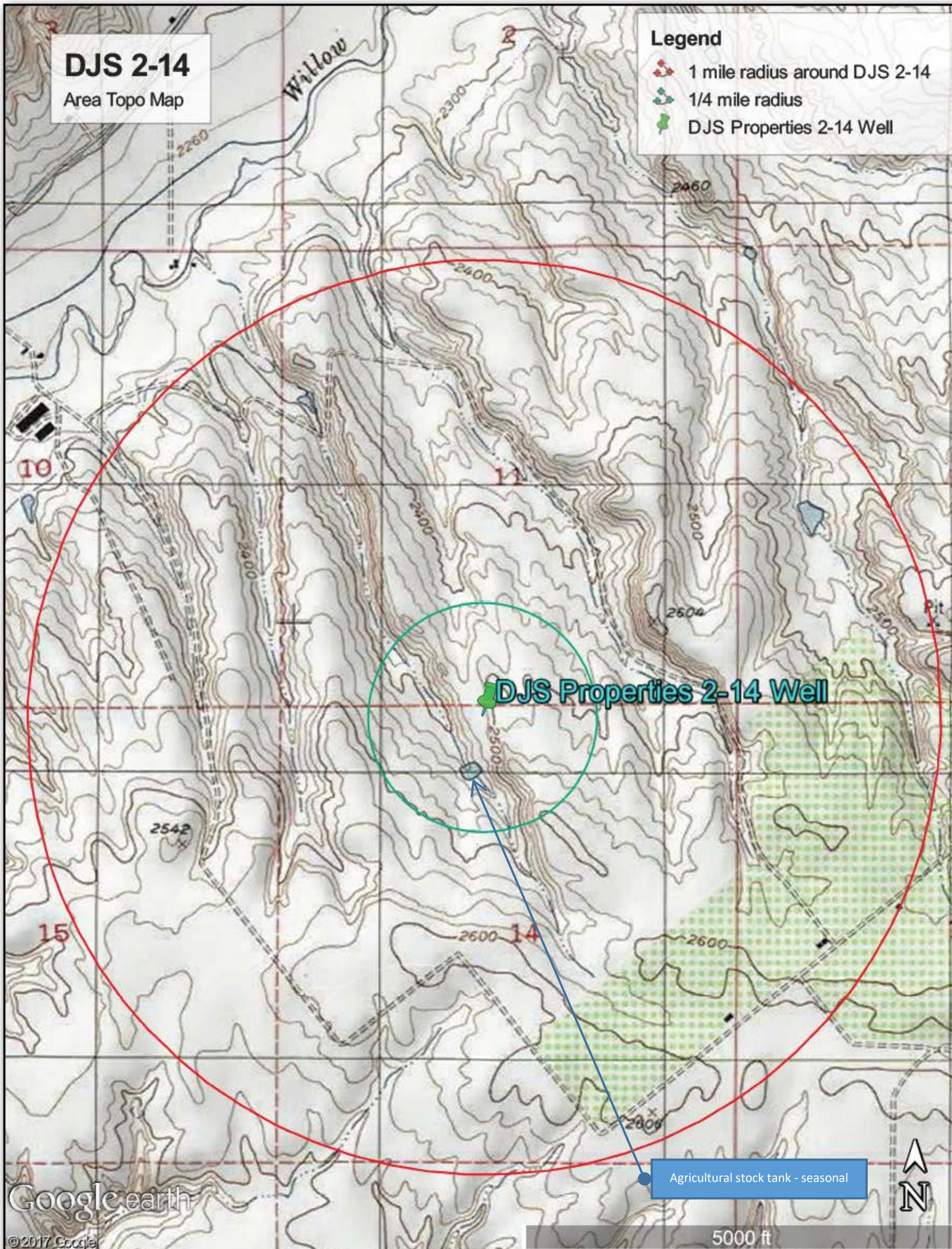
TABLE OF CONTENTS:

ATTACHMENT A

A. **AREA OF REVIEW -** 40 CFR 146.6 requires that the area of review (AOR) for each injection well or each field, project or area of the State be determined per either paragraph (a) or (b) of the regulation. Based on the remote location of the well and the lack of potential pathways which may cause the migration of the injection and/or formation fluid into an underground source of drinking water, AM Idaho LLC has adopted the ¼ mile fixed radius to define the project AOR provided for in the regulations (i.e., 40 CFR 146.6(b)). Specifically, the AOR for this application encompasses a ¼ mile radius circle from the wellbore.

ATTACHMENT B

B. **MAPS OF WELL/AREA AND AREA OF REVIEW -** There are no notable wells, springs, water bodies, etc. within the 0.25 mile radius Area of Review.



-

ATTACHMENT C

C. **CORRECTIVE ACTION PLAN AND WELL DATA -** There are no wells within the area of review.

ATTACHMENT E

E. NAME AND DEPTH OF USDWs (CLASS II) - The Pierce Gulch Aquifer (USDW) is regionally present in the area around the DJS Properties 2-14 Well. In the DJS Properties 2-14, sand is present from the surface to a depth of approximately 250' TVD.

ATTACHMENT G

G. GEOLOGICAL DATA ON INJECTION AND CONFINING ZONES (Class II) - In the DJS Properties 2-14 well the proposed injection zone is in the lower section of the Chalk Hills Formation, which is dominantly composed of massive porous and permeable quartz rich sandstones. The massive sandstones also contain minor thin shaly sandstone and claystone lenses which vary in size both vertically and laterally in the section (See *Figure G-1* on next page). Per well log correlation the top of the injection zone occurs at 4,910' TVD and is 590' in gross thickness (5,500' Well TD). The confining zone is both the overlying Glenns Ferry Formation and the upper and middle Chalk Hills formation. These formations are very widely distributed in this basin and are typically very impermeable claystones. (See *Figure G-2* on page 8). In the DJS Properties 2-14 well the Glenns Ferry formation (approx. 250'-1,600' TVD) is composed of highly impermeable lacustrine Claystone, as well as scattered arkosic sandstones. The upper and middle Chalk Hills formation (approx. 1,600'-4,910'TVD) contains more lacustrine claystone, silicic volcanic ash, and basalt. Per well log correlation the top of the confinement zone is found at 250' TVD and is 4,660' thick. The Pierce Gulch Aquifer is found at the surface and is 250' thick. The Pierce Gulch aquifer is comprised of laminated sandstones interbedded with siltstones and clays.

Geology of the Injection Zone is described *on Figure G-3*, Pages 9-14.

Zone Function	Depth	Thickness	Geologic Name	Lithological Description
USDW Zone:	**Surface – 250’ TVD**	**250’**	**Pierce Gulch Aquifer**	**Sandstone, Claystone/Siltstone**
Confining Zones:	**250’ TVD**	**1,350’**	**Glenns Ferry Formation**	**Lacustrine Claystone**
	1,600’ TVD-4,910’ TVD	**3,310’**	**Upper and Middle Chalk Hills Formation**	**Lacustrine, Claystone and Fluvial Sediments, Silicic Volcanic Ash and Basalt**
Injection Zone:	**4,910’ TVD to TD 5,500’TVD**	**590’**	**Lower Chalk Hills Formation**	**Quartz Rich Sandstone**

The fracture pressure in the lower Chalk Hills Formation @5390’ has been estimated at 3214 psi, based on a 12 ppg equivalent fluid density. A leak off test will be run during the completion procedure to verify the fracture pressure of the confining zone as necessary. Dipole sonic data may become available prior to the completion construction procedure, and will be utilized instead of performing a leak off test to provide the capability to calculate Poisson’s ratio and the associate frac gradients in the injection and confining zones. In addition, a step-rate test will be run prior to injection operations to determine actual fracture pressure in the injection zone. Injection operations will be controlled to always provide at least 50 psi below that pressure.

DJS 2-14 Composite Lithological Section

Figure G-1

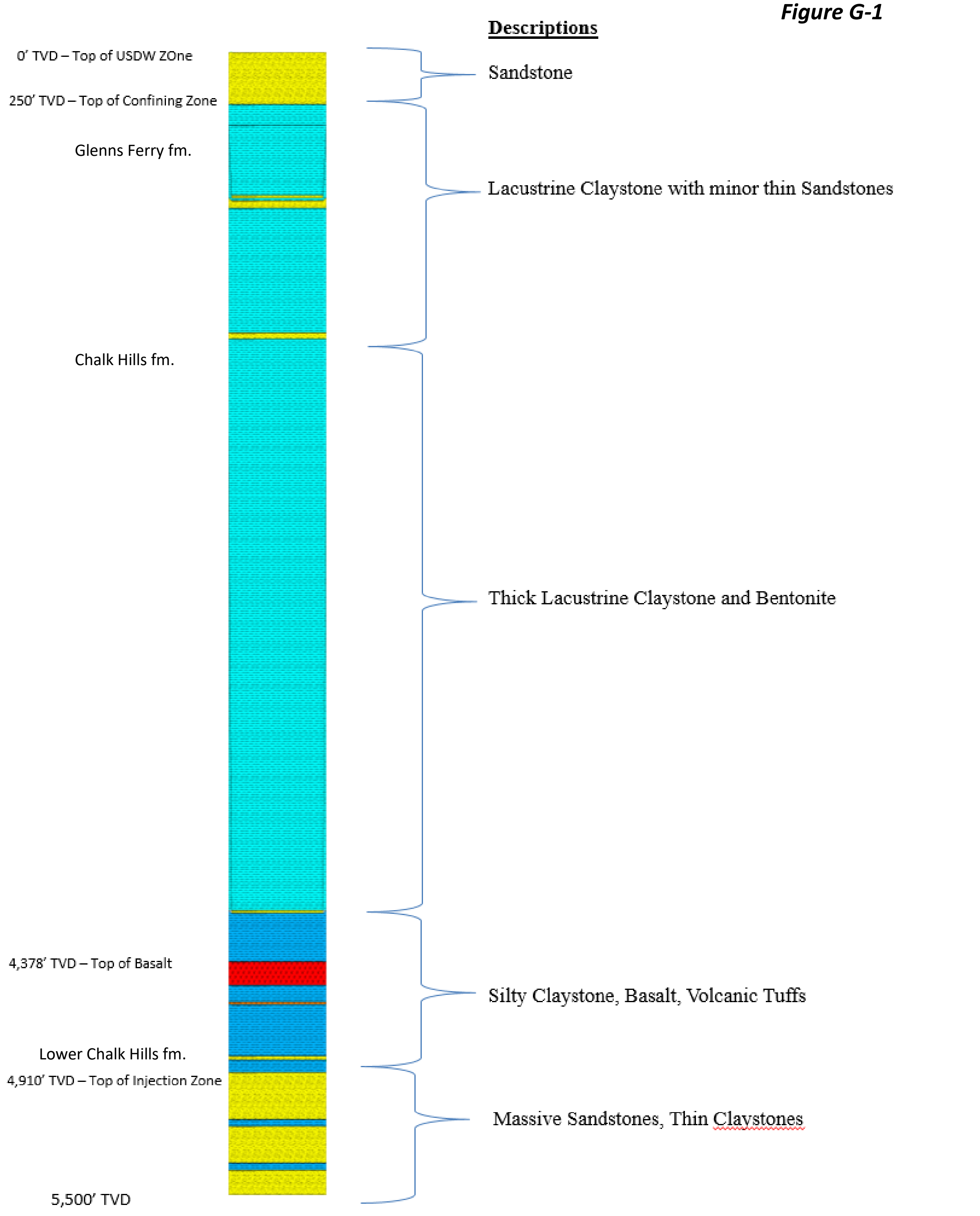


Figure G-2

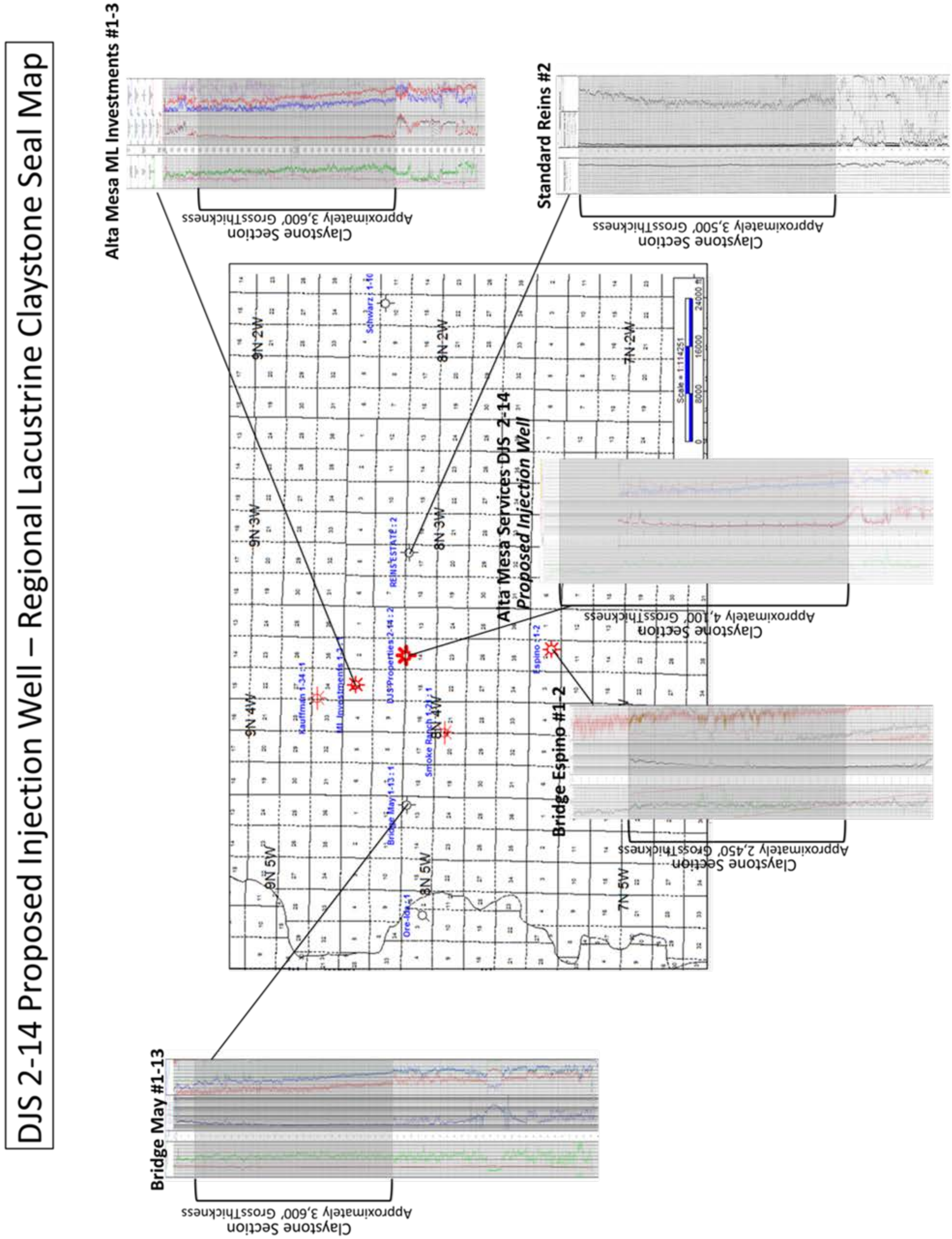

DJS 2-14 Proposed Injection Well – Regional Lacustrine Claystone Seal Map
Alta Mesa ML Investments #1-3
Claystone Section
Approximately 3,600' GrossThickness
Standard Reins #2
Claystone Section
Approximately 3,500' GrossThickness
Alta Mesa Services DJS 2-14
Proposed Injection Well
Claystone Section
Approximately 4,100' GrossThickness
Bridge Espino #1-2
Claystone Section
Approximately 2,450' GrossThickness
Bridge May #1-13
Claystone Section
Approximately 3,600' GrossThickness
9N 2W
9N 3W
9N 4W
9N 5W
8N 2W
8N 3W
8N 4W
8N 5W
7N 2W
7N 5W
Schwarz 1-10
REINS ESTATE 2
DJS Properties 2-14 2
ML Investments 1-3
Kauffman 1-34 1
Smoke Ranch 1-21 1
Bridge May 1-13 1
Espino 1-2
Ore-Ida 1

Figure G-3

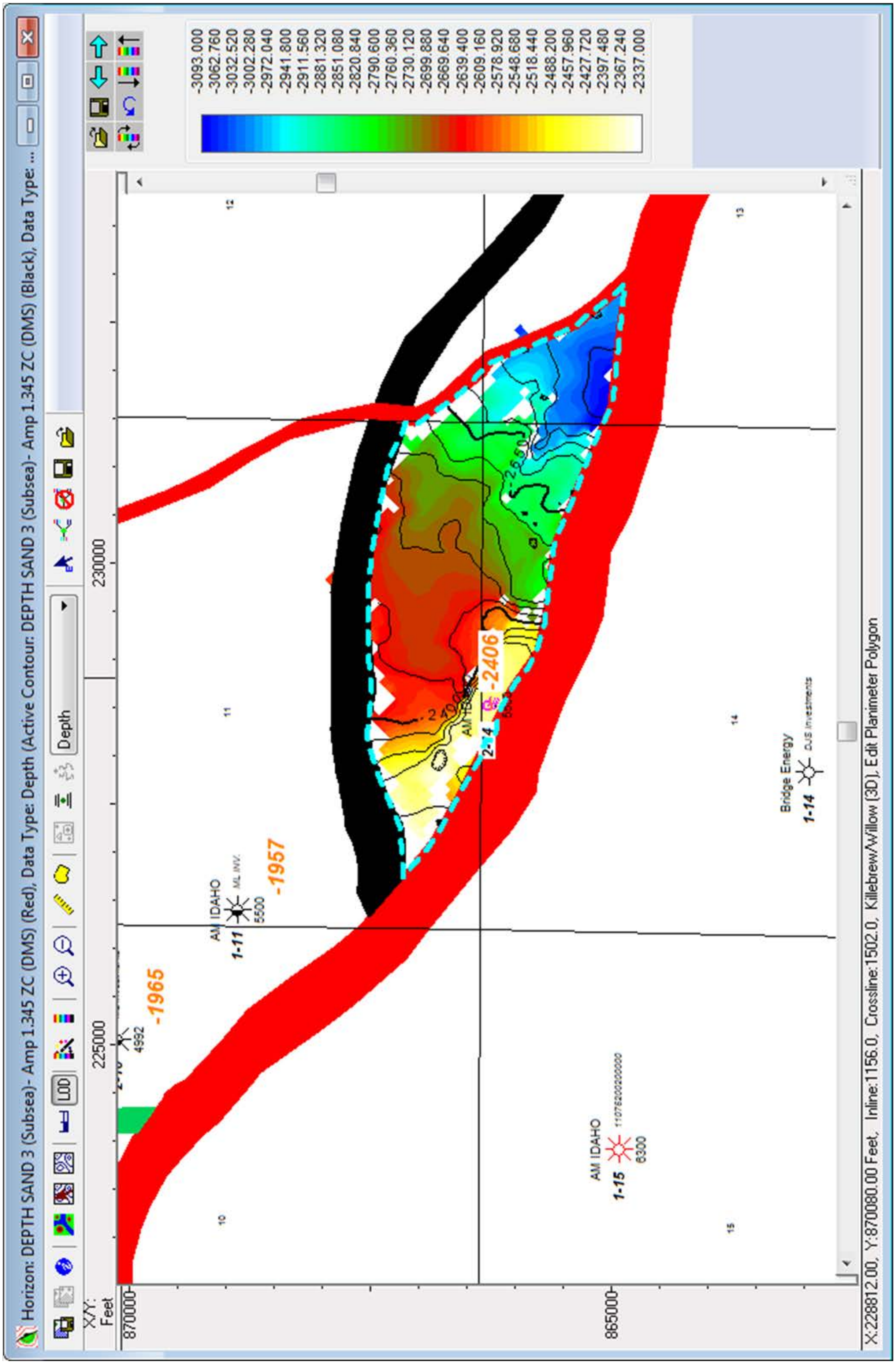
AM Idaho DJS #2-14 Proposed Disposal Well Geologic Setting

Township: 8 North - Range: 4 West - Section 14
Payette County , Idaho

The following structure and Isopach maps were created from interpreting proprietary 3-D seismic data in conjunction with subsurface well control. Subsurface to seismic ties were done by making synthetic seismograms and verifying ties with seismic modelling. Due to the subsurface presence of basalts (very high acoustic impedance), the seismic to subsurface ties are excellent. The quality of the seismic data is very good to excellent, lending strong confidence to the interpretations Presented herein.

Structure Map (subsea): Top Sand 3

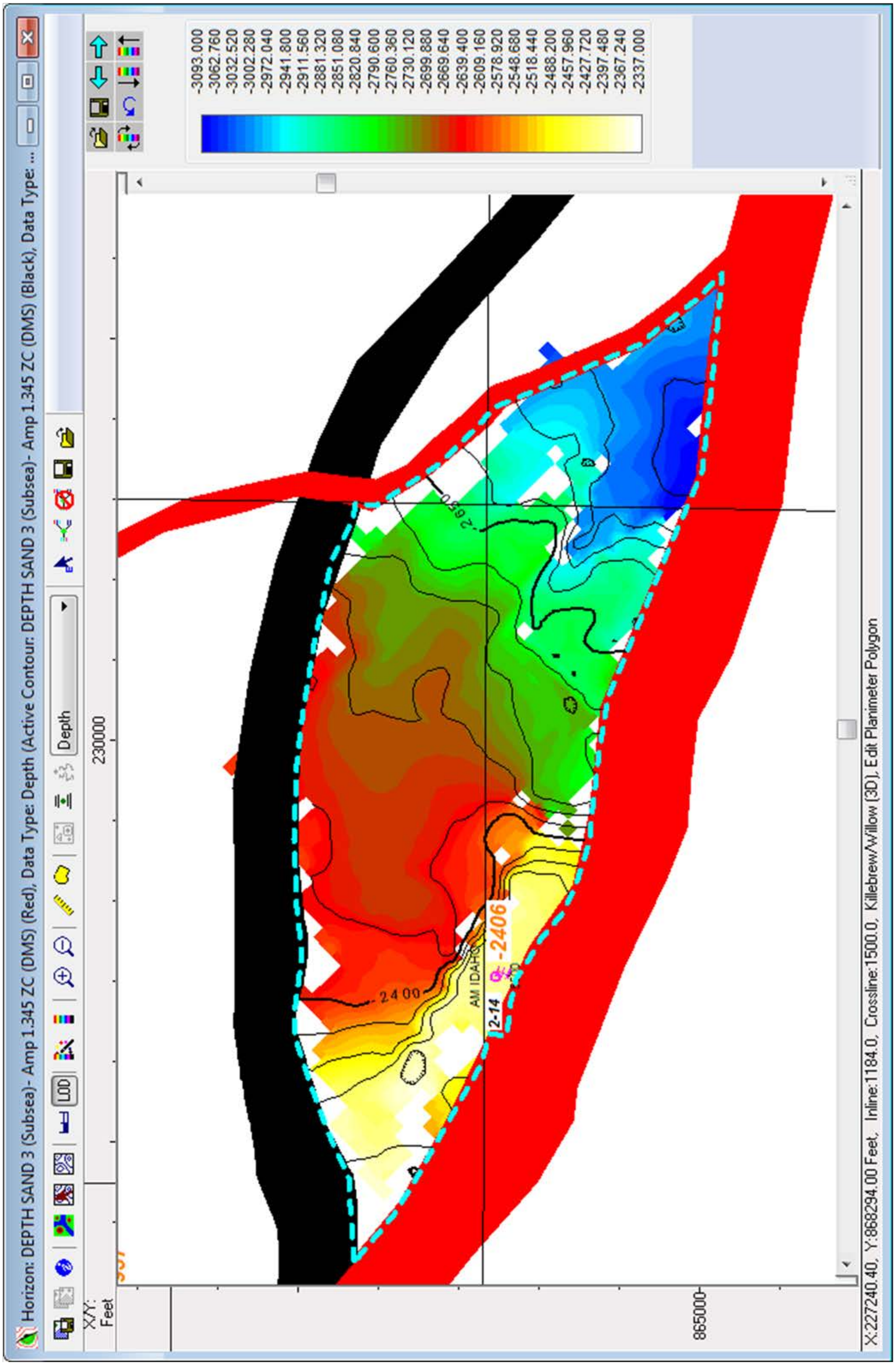
Proposed Injection Zone - Scale 1": 1000'



DMS 9/2017

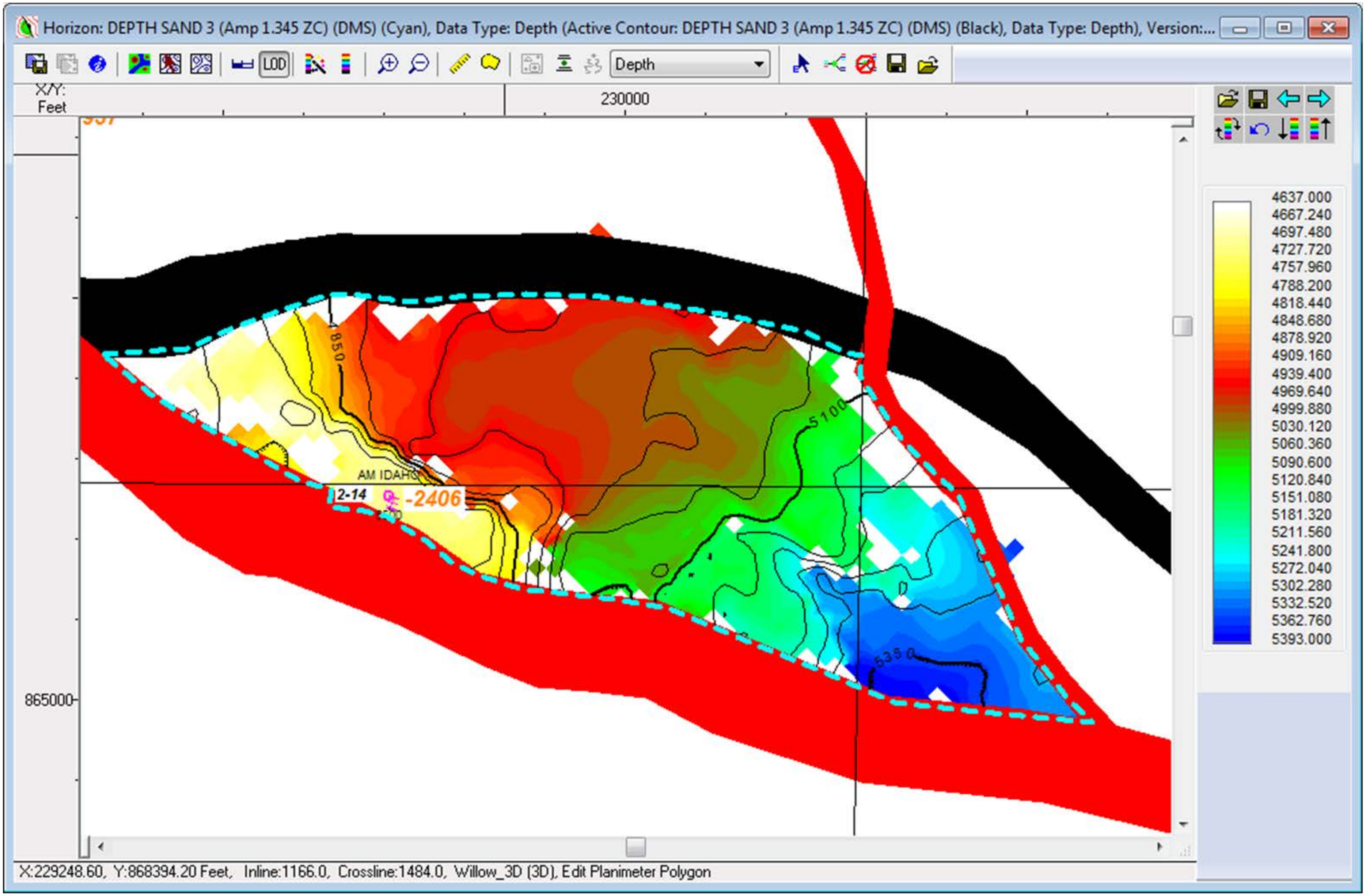
Structure Map (subsea): Top Sand 3

Proposed Injection Zone - Scale 1": 600'



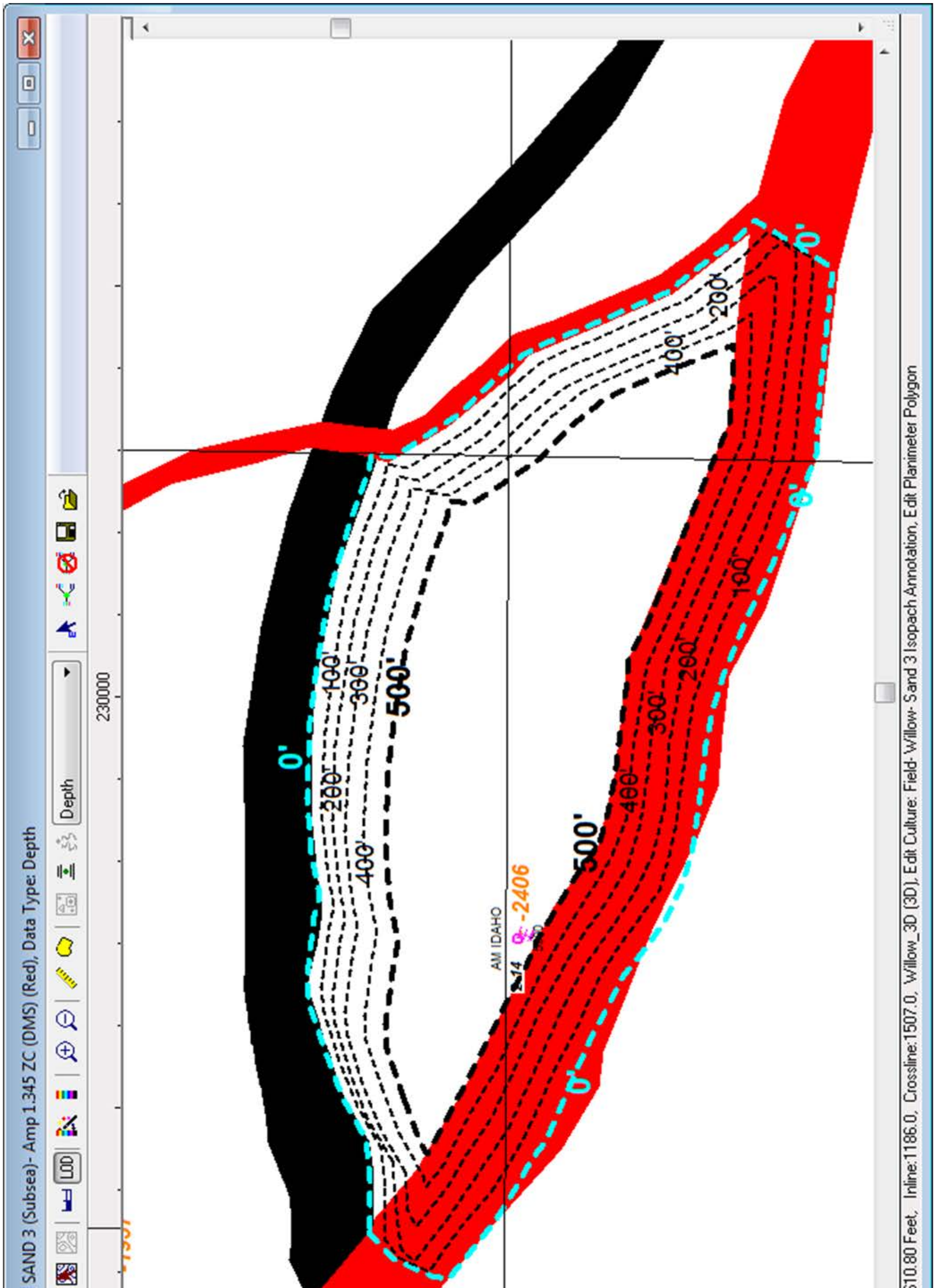
DMS 9/2017

Structure Map (below Ground level datum of 2300’ ASL): Top Sand 3
Proposed Injection Zone - Scale 1”: 600’



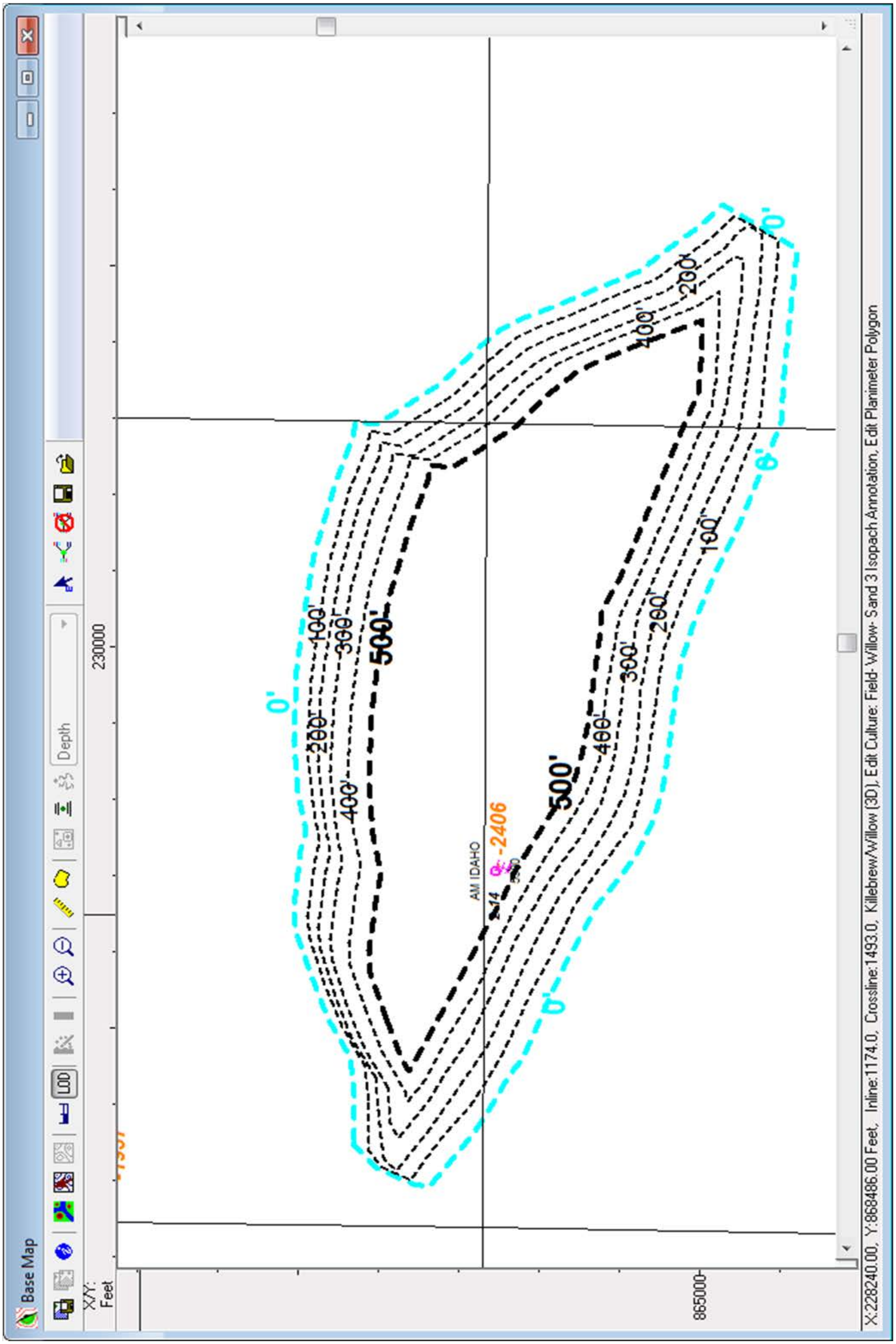
DMS 9/2017

Isopach Map of Sands 3,4,5 –showing Faulting
100' Contour Interval – Scale 1":600'



DMS 9/2017

Isopach Map of Sands 3,4, & 5
Scale 1":600'



DMS 9/2017

ATTACHMENT H

H. OPERATING DATA – The expected average daily rate and volume is 1000 barrels per day (BPD) / 1000 barrels (BBL). The maximum daily rate and volume is expected to be 2600 BWPD / 2600 BBL, based on a mechanistic hydraulic model of the wellbore tubulars and the reservoir characteristics.

The average and maximum surface injection pressures are estimated to be 199 (psig) and 628 psig, respectively, based on the hydraulic model.

The tubing / casing annulus will be filled with 8.8 lb/gallon potassium chloride water, supplemented with an appropriate corrosion inhibitor, biocide, and oxygen scavenger chemical additive package.

A step-rate test will be performed after initial commissioning of the injection facilities and well. The step rate test will allow the reservoir parting pressure to be determined and subsequent injection rates will be limited to maintain injection pressures at least 50 psi below this pressure.

The source of the injection fluid is produced water, associated with the oil and gas production operations of wells operated by AM Idaho LLC in the surrounding area. An analysis of the produced water is attached (See below - Wastewater Characteristics, EPA Methods). The produced water in this area is very low salinity and low TDS since the geologic sedimentary history is that of a lacustrine nature.

Wastewater Characteristics, EPA Methods

Alta Mesa	Date	Alkalinity (mg CaCO3/L)	Barium (mg/L)	BOD (mg?L)	Boron (mg/L)	Calcium (mg/L)	Chloride (mg/L)	COD (Mg/L)	Conductivity (µmhos/cm)	Cyanide (free) (mg/L)	Fluoride (mg/L)	Hexane extractable material (HEM) (mg/L)	Gross Alpha (pCi/L)	Gross Beta (pCi/L)	Iron (mg/L)	Manganese (mg/L)	Mercury-CVAFS (mg/L)	NO3/N (mg/L)	Potassium....(mg/L)	Radium 226 (pCi/L)	Radium 228 (pCi/L)	Methanol (mg/L)	Silica (as SiO2) (mg/L)	Silicon (mg/L)	Sodium (mg/L)	TDS (mg/L)	TSS (mg/L)	Strontium (mg/L)	Sulfate (mg/L)	MBAS (mg/L)	Turbidity (NTU)
WP4-1	March 13, 2017	525	0.315	>38.0	7.61	70.7	874	277	4320	0.0131	1.89	7.2	0.120 +/- 5.49	592 +/- 31.8	2.54	0.240	4.31	0.477		0.516 +/- 0.292	0.972 +/- 0.220	9470	50.9	23.8	404	2910	12.4	2.15	47.3	0.137	9.66
Tank Battery	May 23, 2016	419	0.144		6.93	16.1	143		1700	0.0197	7.77		0.013 +/- 1.62	20.4 +/- 4.00	2.33		0.476		40.8	0.05 +/- 0.10	-0.136 +/- 0.555	667	77.5	36.2	314	1420	15.7	0.508	9.58	0.166	48.5

Wastewater Characteristics, EPA Methods

Alta Mesa	Date	Diesel (mg/L)	Lube Oil (mg/L)	Gasoline (mg/L)	1,2,4-Trimethylbenzene (ug/L)	1,3,5-Trimethylbenzene (ug/L)	Acetone (ug/L)	Benzene (ug/L)	Ethylbenzene (ug/L)	Isopropylbenzene (ug/L)	m+p-Xylene (ug/L)	Methyl ethyl ketone (MEK) (ug/L)	Naphthalene (ug/L)	n-Propylbenzene (ug/L)	o-Xyllene (ug/L)	Toluene (ug/L)	1-Methylnaphthalene (ug/L)	2,4-Dimethylphenol (ug/L)	2-Methylnaphthalene (ug/L)	2-Mehtylphenol (ug/L)	3+4--Mehtylphenol (ug/L)	Bis(2-Ethylhexyl)phthalate (ug/L)	Fluorene (ug/L)	Naphthalene (ug/L)	Phenanthrene (ug/L)	Phenol (ug/L)	Pyrene (ug/L)
WP5-1 3:00 p.m.	March 13, 2017	438		80.2	178	103	1390	20000	657	41.4	2500	587	44.2	37.4	729	11500											

A calculation of the expected injection reservoir capacity was performed. This calculation assumes a confined reservoir pore space as defined by the isopach of the injection zone in a fault block bounded on 3 sides by faults (see Attachment G for details). The bulk volume is calculated by determining the area of each isopach interval and using the average of the areas to calculate the total bulk injection reservoir volume. A porosity of 23% is estimated from open hole wireline logs for the injection interval. Water saturation is estimated at 80%, with a complimentary 20% gas saturation. This is based on the swab test of the 5380-5390 perforations, where gas blows were experienced and a water sample showed the presence of Benzene and other VOC's naturally associated with water associated with hydrocarbon reservoirs. The average net reservoir to bulk thickness ratio is estimated at 90% from a review of the mud log for this interval. The pore space is estimated to contain 152 million reservoir barrels. Under confined injection, the water, gas, and pore space will compress and expand respectively to allow for water influx as pore pressure increases. The maximum allowable pressure is defined by staying 10% below fracture pressure. Fracture pressure is estimated to be equivalent to a 12 lb/gallon gradient (3214 psi at 5150'). Note that the actual parting pressure will be well defined upon completion of the well by the execution of a step rate test. The original pressure is estimated at a pressure equal to an 8.6 lb/gall on equivalent pressure gradient (2276 psi at 5150'). The maximum allowable pressure used in the calculation of Injection Zone Capacity is 90% of the fracture pressure (90% of 3214 = 2892 psi). This provides for an allowable increase in the reservoir pressure of 616 psi (2892-2276). Water, gas, and pore space compressibility's are estimated using standard oil and gas industry correlations. Based on the original reservoir volume, along with the allowable pressure increase and the sum of the compressibilities, it is estimated that a total of 7,773 thousand reservoir barrels can be injected into this space before the pressure limit is reached. This equates to 7,368 thousand stock tank barrels based on a water reservoir volume factor of 1.055 RB/STB.

Calculation of Confined Injection Zone Capacity

DJS Properties #2-14 Injection Zone

Calculation of Reservoir Volumes:

Porosity	0.23	fraction	from well log
Sw	0.80	fraction	water saturation - evidence of gas in swab testing and water analysis
Sg	0.20	fraction	gas saturation - evidence of gas in zone from swab testing - residual gas
Gross Volume	94,700	acre-ft	from planimetry calculations below
Net/Gross Ratio	0.90	fraction	from well logs
Pore Volume	19,603	acre-ft	

Reservoir Isopach Area Planimeter Readings:

CONTOUR LINE VALUE	AREA > (acres)	RATIO OF AREAS	DELTA CONTOUR (ft)	DELTA VOLUME (acre-ft)	
0	269.00				
100	234.00	0.8699	100	25,150.0	
200	205.00	0.8761	100	21,950.0	
300	173.00	0.8439	100	18,900.0	
400	144.00	0.8324	100	15,850.0	
500	113.00	0.7847	100	12,850.0	
		TOTAL ==>		94,700.0	acre-ft - gross bulk reservoir volume

Injection Zone Capacity

Item	Value	Units	Comments - notes
Datum Depth:	5150	ft, BGL	average depth of injection zone
Average Temperature	251	deg F	ML Investments 1-3 production log
Initial Pressure:	2276	psi	8.6 ppg equivalent pore pressure at datum depth
Fracture Pressure:	3214	psi	12 ppg equivalent pore pressure at datum depth
Maximum Allowable Pressure	2892	psi	90% of fracture pressure
Maximum Pressure Increase (dP)	616	psi	maximum allowable pressure less initial pressure
Average Pressure	2584	psi	average of initial pressure and maximum allowable pressure
Water Salinity	750	ppm Cl	estimated average
Water Compressibility	3.48E-06	1/psi	Osif's Correlation
Gas Compressibility	3.87E-04	1/psi	Meehan et al, Gas gravity = 0.65 from ML Investments 1-10 Well
Rock pore volume compressibility	3.50E-06	1/PSI	Hall's Correlation
Reservoir Water Volume Initial	15,682	acre-ft	Pore Volume * Sw
Reservoir Water Volume Initial	121,663,439	RBbls	Pore Volume * Sw
Reservoir Water Volume Compression	261,022	RBbls	dP * water compressibility* initial water volume
Reservoir Gas Space Volume Initial	3,921	acre-ft	Pore Volume * Sg
Reservoir Gas Space Volume Initial	30,415,860	RBbls	Pore Volume * Sg
Gas Pore Space Compression	7,250,191	RBbls	dP * gas compressibility * initial gas volume
Pore Space Volume Increase	262,281	Rbbls	dP * pore space compressibility
Total Pore Space volume increase	7,773,494	RBbls	sum of water, gas, and pore space compression
Bw (water formation volume factor):	1.055	RBbl/STBbl	McCain's Correlation
Total Stock Tank Barrels Capacity	**7,368,241**	**STBbls**	adjust to surface conditions by dividing by water formation volume factor (Bw)

Stock tank barrels are measured at atmospheric pressure and 60 degrees F.

ATTACHMENT I

I. **FORMATION TESTING PROGRAM –** A step rate test will be run at the time of initial completion to determine the actual parting pressure of the injection interval after the packers and tubing is installed. The water used in this test will be from the same source as the proposed source water. Surface injection pressure and injection rates will be measured during the step rate test. The determination of bottom hole parting pressure will be indicated by a departure in the injectivity ratio (dRate/dPressure) when the parting pressure is exceeded. The pressure defined by the intersection of the slopes of the injectivity data below and above parting pressure will define the surface maximum injection pressure. All injection operations will be held to 50 psi or more below this pressure to assure that fracturing of the injection interval does not occur. Bottom hole pressures will be calculated based on the density of the fluid being injected, along with surface pressure measurements. Water samples were collected and analyzed on the interval at 5380-90' and is believed to be representative of the entire interval being proposed for injection.

ATTACHMENT J

J. **STIMULATION PROGRAM –** No stimulation program is expected to be needed. The sandstone in this area has good permeability and the unstimulated injectivity should be sufficient.

ATTACHMENT K

K. **INJECTION PROCEDURES** – Individual monitoring of the DJS Properties #2-14 is planned. Gauges will be installed at the wellsite, and a flow meter will be installed at the pump station. Casing pressure will be maintained at 0 psig. If any pressure is noted on the annulus between the tubing and the production casing, injection will immediately be halted. Injection will not be resumed until the source of the pressure has been identified and repaired. Injection pressure at the wellhead on the tubing will be maintained 50 psi below parting pressure. An initial step-rate test will be performed to determine parting pressure to beginning injection operation. Produced water will be gathered into stock tanks and through additional settling and filtration vessels, as necessary to assure clean water is pumped downhole. A polish filter will be installed at the wellhead to catch any solids that make their way to the wellhead. An injection pump will be located near the stock tanks to pressurize the water and transport the water via flowline to the wellhead. A pressure relief valve will be installed on the pump to prevent excessive pressure from being placed on the flowline. This relief valve will be piped back to the source tanks or to the intake of the pump. Source water will be provided by the producing wells. The flowline will be buried below grade to avoid freezing issues. The portion of the flowline above grade will have insulation and heat tracing to avoid freezing during winter operations. The flowline easement and wellhead will be visually inspected daily (within reason, due to considerations of weather and other force majeure) by field operating personnel.

ATTACHMENT L

L. **CONSTRUCTION PROCEDURES** –

Historical:

Spud well 9/11/2014. Surface hole was drilled with 12 ¼" bit to 1093'. 9 5/8" 40 lb/ft K-55 LTC casing was then set at 1082' and was cemented back to surface. An 8.75" hole was drilled to 5,500' and production casing was then run and cemented (7" 26 lb/ft J-55 LTC casing with bow spring centralizers). A top down cement job was then performed on the 7" casing, to provide cement coverage between the production casing and the surface casing down below the shoe of the surface casing. The prospective hydrocarbon intervals were then tested by perforating and flow/swab tested each of 5 intervals between 5390' and 4306'. All tested non-commercial. The first zone at 5380-5390' did have good gas blows during swabbing. Cement retainers or bridge plugs were set between intervals during the testing operations which proceeded from the bottom to the top interval, and was also placed above last interval after testing. Testing was completed by 11/3/2014. See attached wellbore diagram.

Planned Injection Completion Construction:

1. Move in workover rig.
2. Pressure test casing above bridge plug at 4,294'
3. Drill out plugs and retainers to below float collar to 5,450'. If dipole sonic data is not available, run leak-off test prior in the Confining Zone to verify fracture gradient in the Confining Zone.
4. Add perforations in interval 5390 – 5410'.
5. Run tubing, packer and isolation packer to 4860' and set upper packer at 4200'. (see attached wellbore diagram).
6. Install wellhead assembly.
7. Run step rate test with actual produced water to determine parting pressure and injectivity.
8. Connect gauges and filter pod, flowline, pump, and commission injection system.

ATTACHMENT M

M. **CONSTRUCTION DETAILS** – See the following pages for wellbore schematics.

Well: DJS 2-14

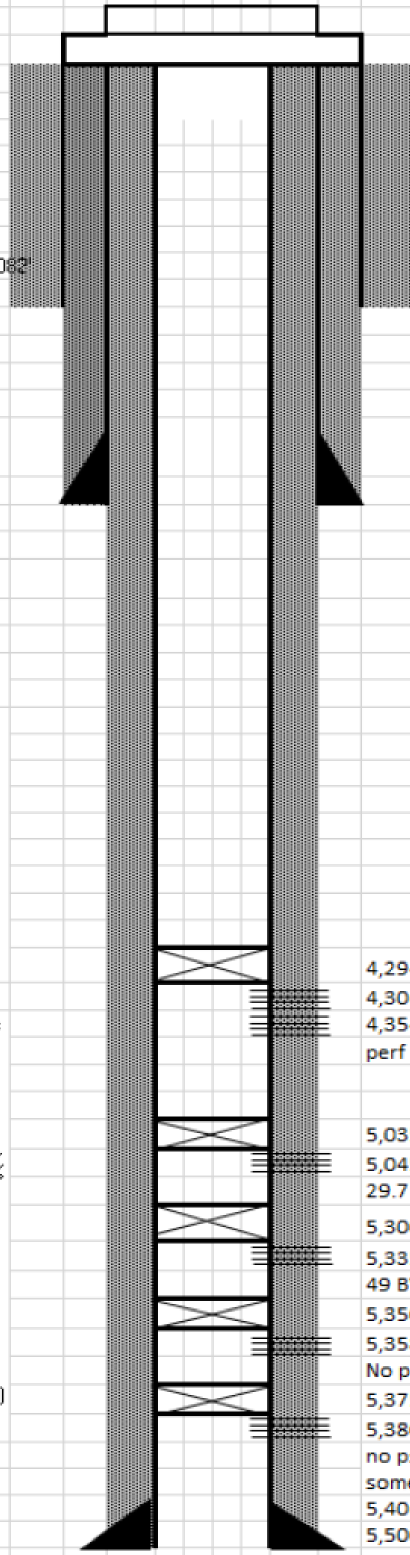
Willow Field - Payett County, ID

Current Wellbore Diagram as of 11/3/2014 - Well Temporarily Abandoned

Spud 9/12/2014 T&A'd 11/3/2014

GL Elevation above MSL: 2,488'

5K Dual - Master Single Wellhead



Casing & Cement

Conductor .: 13 3/8 OD, @ 80'

Surface: 24 jts, 9-5/8" OD, 8.83 ID,40#, K-55 @ 1,082'
215 Sacks, (144 Bbls) Type III Cement + Slurrylite 50 Pps, 20% MS-500, 5% HW Gypsum, 5% Salt B.W.O.W., 0.75% TSFL-180, 0.25% CFL-300, 3.77 ft3/sk, 14.22 gal/sk, 10.4 ppg. Followed by 70 sacks, (17 Bbbls) Type III Cement + 5% Salt B.W.O.W., 1.36 ft3/sk, 6.42 gal/sk, 14.8 ppg.

Pump Top Job as Follows: Pump 116 sacks (23 Bbls) Calprem Cement + 2% Cacl2, 1.15 ft3/sk, 5 gal/sk, 15.8 ppg. Pump Top out cement @ 1.0 Bpm & 100 psi. (4 Bbls Cement to surface)

Production: 7" OD, 6.276" ID, J-55 @5,500'
Run 122 Total joints of 7", 26# J-55, LTC Casing as follows:
Float Shoe set @ 5,500', 2 Joints of Casing, Float collar set @ 5,406', 120 Joints of casing. Ran 64 Total 7" X 8 1/2" Bow Spring Centralizers, 1- Centralizer 10' above Shoe, 1- Centralizer on 1st casing Collar, 1- Centralizer 10' Below Float Collar, Centralizer on every Joint to Joint # 44 @ 3,509'. Then every 4th Joint to Joint #120 @ 80'. Centralizers Where Installed on collars on Casing Joints. Filled & circulated every 20 joints (No tight hole or problems Running Casing) (Tag with Joint #122 @ 5,500');

Cement as Follows: Pump 10 bbls of Diesel, 25 bbls of 10.0 Ppg Weighted Spacer @ 4.0 Bpm and 250 psi, Followed by 400 Sacks, (129 Bbls) TCI lite 61.6 Pps, Class G Cement, 25.9 Pps Flyash, 5.22 Pps gel, 1.82 ft3/sk, 9.72 gal/sk, 12.7 ppg. Pump Lead cement @ 3 Bpm & 340 psi. Followed by 265 Sacks, (54.7 Bbbls) Gas Seal Cement, Class G Cement, 3% Salt, 0.75% TSFL-180, 0.2% C-49, 1.16 ft3/sk, 4.9 gal/sk, 16.0 ppg. Pump Tail cement @ 3 Bpm & 239 psi. Displace with 208 Total Bbls as Follows: 152 Bbls 4% KCL Water @ 2 Bpm & 1300 Psi, (Lost Returns With 152 Bbls Displacement Away) (No Returns on last 56 Bbls) Pumped last 56 Bbls Displacement @ 1 Bpm & 3,700 Psi. (Bumped plug With 4,200 psi) Bleed off 2.5 Bbls, Check Floats, Floats Held Good. (No Spacer or Cement to Surface)

Pumped 9 cubic yards cement top-down job.

80' 14" Conductor Cmt?????

24 jts 9 5/8" casing
1,034' set float collar — Surface Casing
1 Joint 9 5/8" casing

1,057' TOC
1,082' set float Shoe

4,294' CIBP (11/3/14)
4,306-30' perf w/ 2" RTG x 4 JSPF x 120 deg ph (11/1/14)
4,354-74' perf w/ 2" RTG x 4 JSPF x 120 deg ph (11/1/14)
perf in 2 runs, no prs 13.5 BW, 0 BO, 0 MCF

5,035' CIBP (10/31/14)
5,045-50' perf w/ 2" RTG x 4 JSPF x 120 deg ph (10/28/14
29.7 BW, 0 BO, 0 MCF
5,300' CIBP (10/28/14)
5,335-38' perf w/ 2" RTG x 4 JSPF x 120 deg ph (10/27/14
49 BW, 0 BO, 0 MCF
5,350' Cement ratianer (10/26/14)
5,358-60' perf W/ 3 1/8" csg gun, 4 JSPF x 90 deg ph (10/
No prs after, 2 hrs no flow; 26.1 BW, 0 BO, 0 MCF
5,375' cement retainer (10/24/14)
5,380-90' perf W/ 4 JSPF x 90 deg ph (10/22/14)
no psi after perf - Rec. 37 BW, no oil show
some gas vapers w/ swab runs
5,406' float collar
5,500 float shoe

5,500' TVD

Well Name & No.: DJS Properties 2-14	Field: Willow
County: Payette	State: Idaho
Total Depth (MD): 5,500'	(TVD) 5,500'
Date Completed: T&A on 11/3/2014	Latest Revision Date: 2/3/2015

EPA – UNDERGROUND INJECTION CONTROL PERMIT APPLICATION ATTACHMENTS

Well: DJS 2-14
Willow Field - Payett County, ID
Proposed Injection Completion Configuration
Spud 9/12/2014 T&A'd 11/3/2014

GL Elevation above MSL: 2,488'

<u>Casing & Cement</u>
Conductor : 13 3/8 OD, @ 80'

Surface: 24 jts, 9-5/8" OD, 8.83 ID,40#, K-55 @ 1,082'
215 Sacks, (144 Bbls) Type III Cement + Slurrylite 50 Pps, 20% MS-500, 5% HW Gypsum, 5% Salt B.W.O.W., 0.75% TSFL-180, 0.25% CFL-300, 3.77 ft3/sk, 14.22 gal/sk, 10.4 ppg. Followed by 70 sacks, (17 Bbbls) Type III Cement + 5% Salt B.W.O.W., 1.36 ft3/sk, 6.42 gal/sk, 14.8 ppg.

<u>Pump Top Job as Follows</u>: Pump 116 sacks (23 Bbls) Calprem Cement + 2% Cacl2, 1.15 ft3/sk, 5 gal/sk, 15.8 ppg. Pump Top out cement @ 1.0 Bpm & 100 psi. (4 Bbls Cement to surface)

Production: 7" OD, 6.276" ID, J-55 @5.500'
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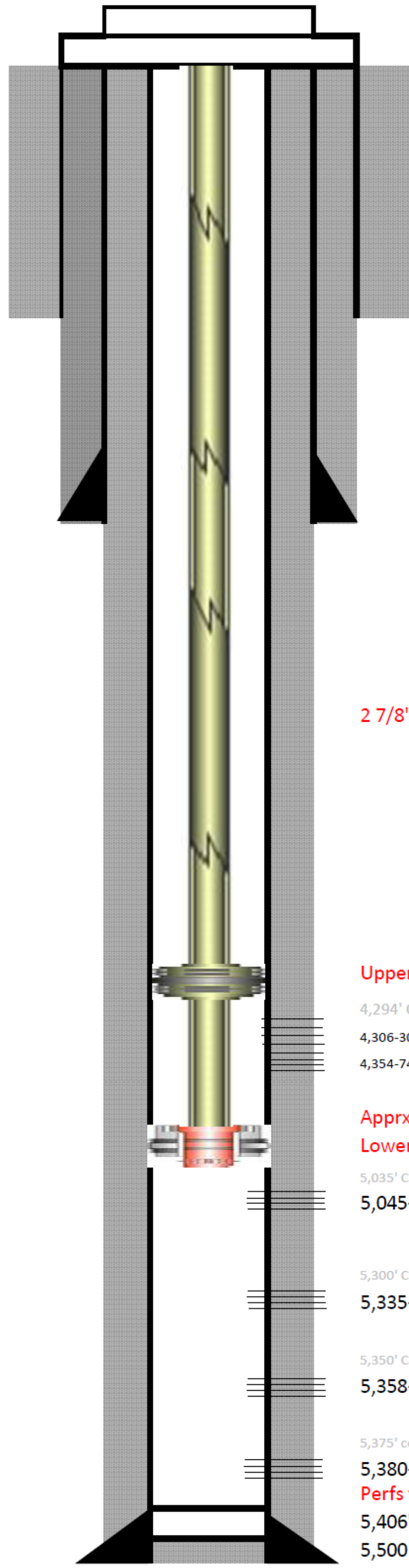
<u>Cement as Follows</u>: Pump 10 bbls of Diesel, 25 bbls of 10.0 Ppg Weighted Spacer @ 4.0 Bpm and 250 psi, Followed by 400 Sacks, (129 Bbls) TCI lite 61.6 Pps, Class G Cement, 25.9 Pps Flyash, 5.22 Pps gel, 1.82 ft3/sk, 9.72 gal/sk, 12.7 ppg. Pump Lead cement @ 3 Bpm & 340 psi. Followed by 265 Sacks, (54.7 Bbbls) Gas Seal Cement, Class G Cement, 3% Salt, 0.75% TSFL-180, 0.2% C-49, 1.16 ft3/sk, 4.9 gal/sk, 16.0 ppg. Pump Tail cement @ 3 Bpm & 239 psi. Displace with 208 Total Bbls as Follows: 152 Bbls 4% KCL Water @ 2 Bpm & 1300 Psi, (Lost Returns With 152 Bbls Displacement Away) (No Returns on last 56 Bbls) Pumped last 56 Bbls Displacement @ 1 Bpm & 3,700 Psi. (Bumped plug With 4,200 psi) Bleed off 2.5 Bbls, Check Floats, Floats Held Good. (No Spacer or Cement to Surface)

Pumped 9 cubic yards cement top down surface job.



5,500' TVD

Well Name & No.: DJS Properties 2-14	Field: Willow
County: Payette	State: Idaho
Total Depth (MD): 5,500'	(TVD) 5,500'
Date Completed: T&A on 11/3/2014	

ATTACHMENT O

O. PLANS FOR WELL FAILURES -- The potential areas of concern for this type well are three points: 1) packer to casing seal, 2) tubing connections or tubing body leak, or 3) tubing hanger seals. For any of these components a leak will be indicated by the existence of pressure on the tubing / casing annulus pressure gauge. These type of leaks will be contained within the wellbore envelope. If pressure is observed on the casing gauge, injection operations will immediately cease. The wellhead will be isolated by closing in all wellhead valves and the pump and flowline valves will be closed. The tubing hanger seals will be inspected using a wellhead service company technician who can pressure test the seals for leaks. After this testing is done, a workover rig will be utilized to repair the leaking seals or to pull the tubing and packer so that they can be inspected for leaks and replaced as necessary. Injection will not be reinstated until the leak is repaired and the annulus is pressure tested to verify integrity of the injection components.

Mechanical integrity tests will be run periodically according to permit requirements by applying pressure on the annulus between the production casing and the tubing. This test is designed to detect any production casing weakness. If any leaks are noted, injection operations will not resume until the leak is located and repaired.

ATTACHMENT Q

Q. PLUGGING AND ABANDONMENT PLAN – See proposed Post-Injection Plugging Configuration wellbore diagram and associated EPA Form 7520-14 which details the proposed plugging and abandonment plan for this well.

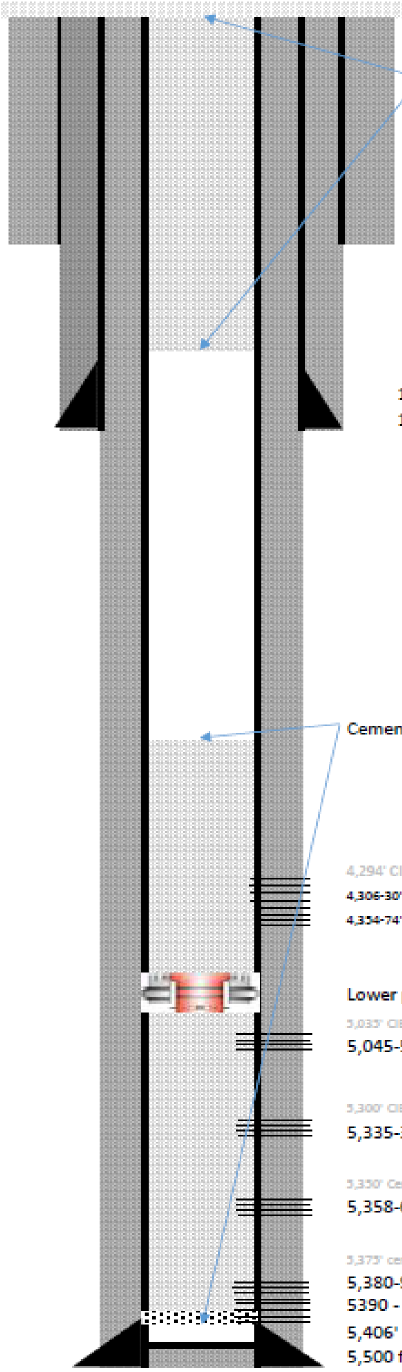
Well name: DJS 2-14

Willow Field - Payette County, ID

Proposed post-injection plugging configuration

Spud 9/12/2014 T&A'd 11/3/2014

GL Elevation above MSL: 2,488'



Casing & Cement

***Conductor*:** 13 3/8 OD, @ 80'

***Surface*:** 24 jts, 9-5/8" OD, 8.83 ID,40#, K-55 @ 1,082'

215 Sacks, (144 Bbls) Type III Cement + Slurrylite 50 Pps, 20% MS-500, 5% HW Gypsum, 5% Salt B.W.O.W., 0.75% TSFL-180, 0.25% CFL-300, 3.77 ft3/sk, 14.22 gal/sk, 10.4 ppg. Followed by 70 sacks, (17 Bbls) Type III Cement + 5% Salt B.W.O.W., 1.36 ft3/sk, 6.42 gal/sk, 14.8 ppg.

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Cement as Follows: Pump 10 bbls of Diesel, 25 bbls of 10.0 Ppg Weighted Spacer @ 4.0 Bpm and 250 psi, Followed by 400 Sacks, (129 Bbls) TCI lite 61.6 Pps, Class G Cement, 25.9 Pps Flyash, 5.22 Pps gel, 1.82 ft3/sk, 9.72 gal/sk, 12.7 ppg. Pump Lead cement @ 3 Bpm & 340 psi. Followed by 265 Sacks, (54.7 Bbbls) Gas Seal Cement, Class G Cement, 3% Salt, 0.75% TSFL-180, 0.2% C-49, 1.16 ft3/sk, 4.9 gal/sk, 16.0 ppg. Pump Tail cement @ 3 Bpm & 239 psi. Displace with 208 Total Bbls as Follows: 152 Bbls 4% KCL Water @ 2 Bpm & 1300 Psi, (Lost Returns With 152 Bbls Displacement Away) (No Returns on last 56 Bbls) Pumped last 56 Bbls Displacement @ 1 Bpm & 3,700 Psi. (Bumped plug With 4,200 psi) Bleed off 2.5 Bbls, Check Floats, Floats Held Good. (No Spacer or Cement to Surface)

Pumped 9 cubic yards cement top down surface job.

Well Name & No.: DJS Properties 2-14	Field: Willow
County: Payette	State: Idaho
Total Depth (MD): 5,500'	(TVD) 5,500'
Date Completed: T&A on 11/3/2014	

EPA – UNDERGROUND INJECTION CONTROL PERMIT APPLICATION ATTACHMENTS

Well name: DJS 2-14
Willow Field - Payette County, ID
Proposed post-injection plugging configuration
Spud 9/12/2014 T&A'd 11/3/2014

GL Elevation above MSL: 2,488'

<u>Casing & Cement</u>
***Conductor*:** 13 3/8 OD, @ 80'

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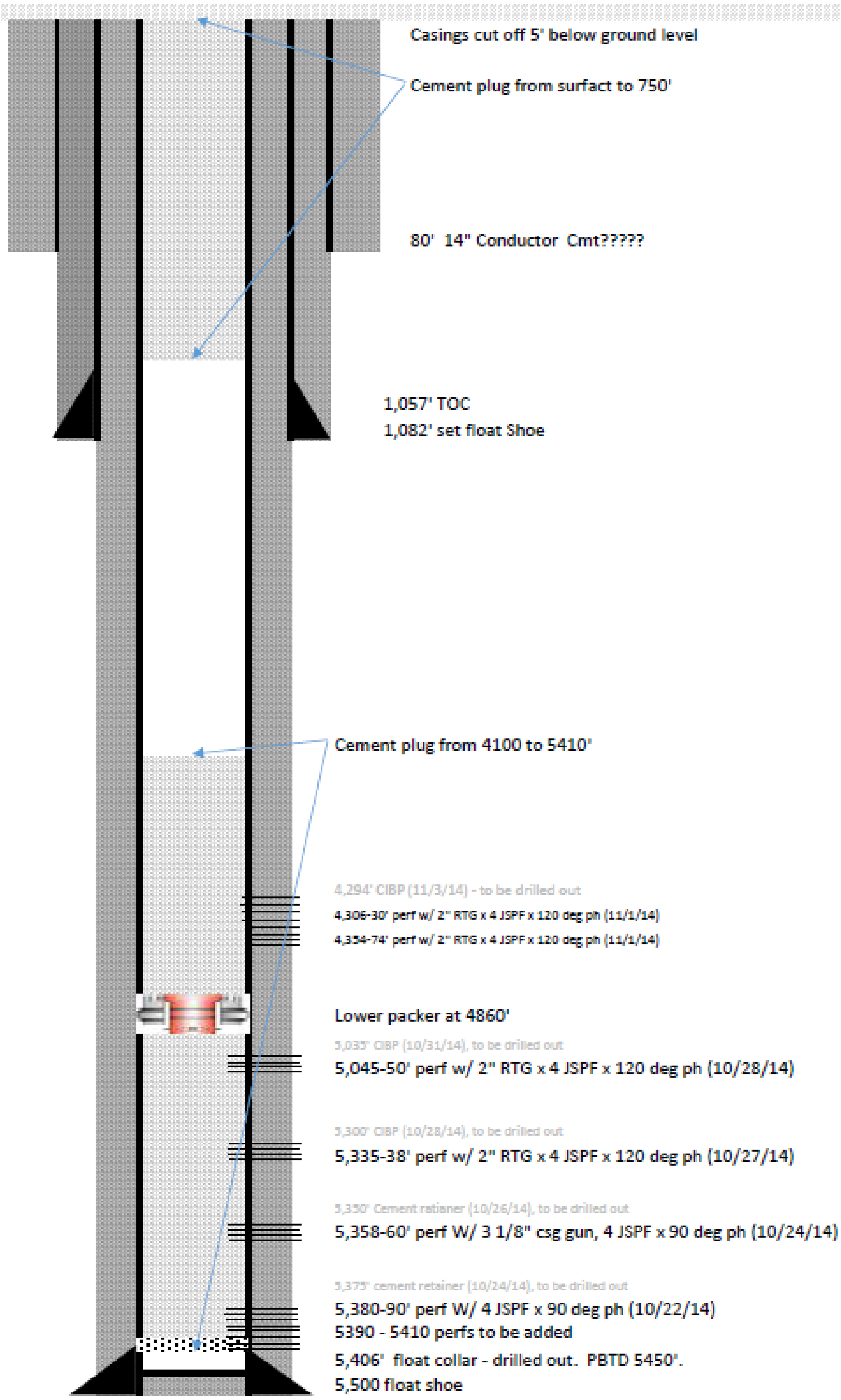
Pumped 9 cubic yards cement top down surface job.



5,500' TVD

Well Name & No.: DJS Properties 2-14	Field: Willow
County: Payette	State: Idaho
Total Depth (MD): 5,500'	(TVD) 5,500'
Date Completed: T&A on 11/3/2014	

OMB No. 2040-0042 Approval Expires 12/31/2018

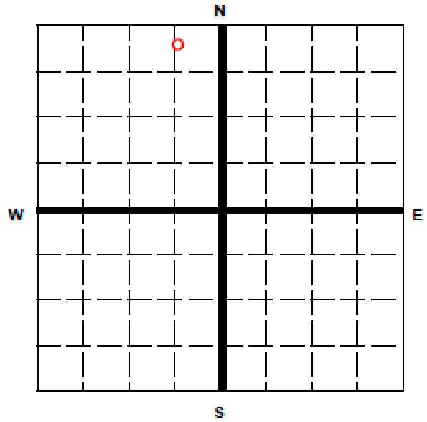
EPA

United States Environmental Protection Agency
Washington, DC 20460

PLUGGING AND ABANDONMENT PLAN

Name and Address of Facility	Name and Address of Owner/Operator
DJS Properties # 2-14	Alta Mesa Services, LP, 15021 Katy Fwy, St 400, Houston, TX 77094

Locate Well and Outline Unit on Section Plat - 640 Acres



State	County	Permit Number
Idaho	Payette	LU600120

Surface Location Description

NE 1/4 of NE 1/4 of NE 1/4 of N 1/4 of Section 14 Township 8N Range 4W

Locate well in two directions from nearest lines of quarter section and drilling unit

Surface Location 95 ft. frm (N/S) N Line of quarter section
and 2315 ft. from (E/W) W Line of quarter section.

TYPE OF AUTHORIZATION

- [x] Individual Permit
- [ ] Area Permit
- [ ] Rule

Number of Wells 1

Lease Name DJS Properties

WELL ACTIVITY

- [ ] CLASS I
- [x] CLASS II
  - [x] Brine Disposal
  - [ ] Enhanced Recovery
  - [ ] Hydrocarbon Storage
- [ ] CLASS III

Well Number 2-14

CASING AND TUBING RECORD AFTER PLUGGING

SIZE	WT (LB/FT)	TO BE PUT IN WELL (FT)	TO BE LEFT IN WELL (FT)	HOLE SIZE
7"	26	5500	5500	8.75"
9.625"	40	1082	1082	12.75
13.375"	61	120	120	17.5"

METHOD OF EMPLACEMENT OF CEMENT PLUGS

- [x] The Balance Method
- [ ] The Dump Bailer Method
- [ ] The Two-Plug Method
- [x] Other

CEMENTING TO PLUG AND ABANDON DATA:	PLUG #1	PLUG #2	PLUG #3	PLUG #4	PLUG #5	PLUG #6	PLUG #7
Size of Hole or Pipe in which Plug Will Be Placed (inche:	7"	7"					
Depth to Bottom of Tubing or Drill Pipe (ft.	5410	750					
Sacks of Cement To Be Used (each plug)	TBD	TBD					
Slurry Volume To Be Pumped (cu. ft.)	282	162					
Calculated Top of Plug (ft.)	4100	0					
Measured Top of Plug (if tagged ft.)	N/A - future	N/A - future					
Slurry Wt. (Lb./Gal.)	TBD	TBD					
Type Cement or Other Material (Class III)	TBD	TBD					

LIST ALL OPEN HOLE AND/OR PERFORATED INTERVALS AND INTERVALS WHERE CASING WILL BE VARIED (if any)

From	To	From	To
4306	4330 (existing perfs)	5380	5390 (existing perfs)
4354	4374 (existing perfs)	5390	5410 (to be added for injection)
5045	5050 (existing perfs)		
5335	5360 (existing perfs)		

Estimated Cost to Plug Wells

TBD - cement type, volumes, density and type to be determined based on regulatory requirements and products in existence at time of plugging.

Certification

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibliity of fine and imprisonment. (Ref. 40 CFR 144.32)

Name and Official Title *(Please type or print)*	Signature	Date Signed

EPA Form 7520-14 (Rev. 12-11)

ATTACHMENT R

R. NECESSARY RESOURCES

This bond replaces and supersedes Aspen American Insurance Co Bond No. SU46286 effective March 28, 2016.

IDAHO DEPARTMENT OF LANDS

IDAHO OIL AND GAS CONSERVATION COMMISSION

BOND

Bond No. 1138356

Known all men by these presents, that we: Alta Mesa Services, LP of the County of: Harris in the state of: Texas as principal, and Lexon Insurance Company of 10002 Shelbyville Rd, Suite 100, Louisville, KY 40223 as surety, authorized to do business in this State, are held and firmly bound unto the State in the penal sum as indicated, lawful money of the United States, for which payment, well and truly to be make, we bind ourselves, and each of us, and each of our heirs, executors, administrators or successors, and assigns jointly and severally, firmly by these presents.

The condition of this obligation is that whereas the above bounden principal proposes to drill a well or wells for oil, gas, or stratigraphic purposes in and upon the following described land situated within the State, to wit: *(May be used for blanket bond or for single well)*

See attached Exhibit "A"

NOW, THEREFORE, if the above bounden principal shall comply with all of the provisions of the laws of the State and the rules, regulations and orders of the Conservation Commission of the State, especially with reference to the proper plugging of said well or wells, and filing with the Oil and Gas Conservation commission of this State all notices and records required by said Commission, in the event said well or wells do not produce oil or gas in commercial quantities, or cease to produce oil or gas in commercial quantities, then this obligation is void; otherwise, the same shall be and remain in full force and effect.

Penal Sum of One Hundred Thousand and No/100 ($100,000.00).

Witness our hands and seals, this 28th day of March, 2016.

Principal: Alta Mesa Services, LP

Principal: [signature]
Michael A. McCabe, CFO

Witness our hands and seals, this 28th day of March, 2016.

Surety (print): Lexon Insurance Company

Surety(signature): [signature]
Teresa D. Kelly, Attorney-in-Fact

(If the principal is a corporation, the bond should be executed by its duly authorized officers, with the seal of the corporation affixed. When principal or surety executes this bond by agent, power of attorney or other evidence of authority must accompany the bond.)

Idaho Oil and Gas Conservation Commission

Approval Date: ____________________

____
Secretary

POA #LX-264759

Form No. P-2

IDAHO DEPARTMENT OF LANDS

This bond replaces and supersedes Aspen American Insurance Company Bond No. SU46311 effective March 28, 2016.

State of Idaho
DEPARTMENT OF LANDS

Surety Bond Number 1136357

Lease/Plan/Permit No(s). See Attached Exhibit "A"

KNOW ALL MEN BY THESE PRESENTS, That we AM Idaho LLC, as principal and Lexon Insurance Company, a corporation organized under the laws of the State of Texas, and having its principal place of business in the State of Kentucky, in the City of Louisville, as surety are held and firmly bound unto the State of Idaho, in the sum of One Hundred Thousand------ dollars ($ 100,000.00) lawful money of the United States, conditioned on the payment of all damages to the surface and improvements thereon of lands described in the above lease/plan/permit specified and any outstanding balances as set forth in the lease/plan/permit. For such payment, well and truly to be made, we bind ourselves, our and each of our heirs, executors, administrators, successors and assignees, as the case may be, jointly and severally, firmly by these presents.

THE CONDITION of the foregoing obligation is such that:

WHEREAS, by lease/plan/permit bearing the above serial number, the lessee/plan holder/permittee was granted specific rights under and pursuant to Idaho Code title 58, chapters 1,3 and 6 or Idaho Code title 47, chapters 7, 8, 13, 15 or 16, and the pertinent rules and regulations of the Idaho State Board of Land Commissioners; and

WHEREAS, said lessee/plan holder/permittee has, by virtue of the lease/plan/permit above referred to, entered into certain covenants and agreements set forth in such lease/plan/permit, under which operations are to be conducted; and

WHEREAS, the said principal, in consideration of being permitted, in lieu of the lessee/plan holder/permittee, to furnish this bond agrees and by these presents does hereby bond himself to fulfill on behalf of the lessee/plan holder/permittee all of the obligations of the said lease/plan/permit in the same manner and to the same extent as though he were the lessee/plan holder/permittee. It is understood and agreed by the surety and the principal that if there is outstanding restoration obligations on the premises, or if outstanding payments are due, this bond shall extend to cover all acts for which restoration is required or payment of such outstanding amounts due, both prior to and subsequent to the date of this bond, until notified in writing by the Idaho Department of Lands that such requirements have been met or the bond has been replaced. The Idaho Department of Lands may require payment of the entire sum of this bond, or portions thereof, upon written notice to the surety, by the department, of the lessee/plan holder/permittee's failure to perform any obligations and/or pay any amounts due under the above referenced statutes and pertinent rules.

The surety shall pay to the Department of Lands the sum of this bond, or portions thereof, as requested by the department within 30 days of receipt of such written notice. In the event of a partial distribution, the remaining funds and liabilities shall not be released until the department notifies the surety, in writing, of release of remaining liability or requires payment of the remaining bond liabilities. Payment of the full sum of the bond to the department shall release the surety of all liabilities and obligations.

NOW THEREFORE, if the above principal shall in good faith observe, carry out and comply with all the laws now existing or hereafter enacted, designed or intended for the protection of the surface owner of said lands against damage and resulting loss caused by any operations carried on under said lease/plan/permit, or if any such damage and resulting loss shall so occur nevertheless, for which damage and loss reimbursement is required and made, then this obligation shall become void, otherwise to remain in full force and effect; and the liability of the surety under this bond for any one or more defaults of the principal under said lease/plan/permit shall not exceed in the aggregate the sum stated herein above; It is further provided, however, that the bond may be cancelled by the surety by the service of written notice of cancellation upon the Director of the Department of Lands of the State of Idaho, such cancellation to be effective at the expiration of ninety (90) days after the service of such cancellation notice by the surety on the Director by registered mail. Such cancellation notice, however, shall not affect any liability that shall have accrued under this bond prior to the effective date of cancellation.

Signed on this 28th day of March, 2016

(Signature of Principal) Michael A. McCabe, CFO
15021 Katy Frwy, Suite 400, Houston, TX 77094
(Business Address)

(Signature of Surety) Teresa D. Kelly, Attorney-in-Fact
10002 Shelbyville Rd, Suite 100, Louisville, KY 40223
(Business Address)

ACKNOWLEDGEMENT OF SURETY

State of Texas)
) ss
County of Harris)

On this 28th day of March, in the year 2016, before me Candace D. Bosheers, a Notary Public in and for the State of Texas, personally appeared Teresa D. Kelly, known to me to be the attorney-in-fact of the corporation that executed the instrument, or the person who executed the instrument on behalf of said corporation, and acknowledged to me that such corporation executed the same.

In Witness Whereof, I have hereunto set my hand and affixed my official seal of day and year first above written.

Notary Public For Harris County, Texas
Residing at: 5444 Westheimer, Suite 900, Houston, TX 77056
My Commission expires January 24, 2020

POA #LX-264760

IDL 1801-29(26) 5-1-2002

ATTACHMENT S

S. **AQUIFER EXEMPTION FOR INJECTION ZONE** – See next three (3) pages for water analysis of the water produced from perforations at 5380 – 5390, which characterizes the water in the proposed injection zone. The depth of this zone, along with the presence of Benzene and other volatile organic compounds would limit or prevent the use of the water in this zone for aquifer uses.

Analytical Laboratories, Inc.
1804 N. 33rd Street
Boise, Idaho 83703
Phone (208) 342-5515

Attn: JEFF JANIK
ALTA MESA SERVICES, LP
15021 KATY FREEWAY STE 400
HOUSTON, TX 77094

Collected By: J JANIK
Submitted By: J JANIK

Perfs 5380 - 5390'

Source of Sample:
DJS PROP 2-14 PRODUCOD WATER

Time of Collection: 16:00
Date of Collection: 10/22/2014
Date Received: 10/23/2014
Report Date: 11/7/2014

Field Temp:
PWS:

Temp Rcvd in Lab: 20.4 °C
PWS Name

Laboratory Analysis Report

Sample Number: 1442245

NO FIELD TEMP GIVEN; NO TRAVEL BLANKS RCVD; Methane, Ethane, and Ethene testing were performed by Accutest Mountain States (AMS).

Test Requested	MCL	Analysis Result	Units	MDL	Method	Date Completed	Analyst
Aluminum, Al	UR	1.12	mg/L	0.10	EPA 200.7	10/24/2014	KC
Arsenic Low	0.01	< 0.005	mg/L	0.005	EPA 200.8	11/3/2014	JH
Barium, Ba	2	0.12	mg/L	0.05	EPA 200.7	10/24/2014	KC
Boron, B		7.40	mg/L	0.10	EPA 200.7	11/4/2014	KC
Calcium, Ca	UR	51.1	mg/L	0.50	EPA 200.7	10/28/2014	KC
Iron, Fe	UR	11.9	mg/L	0	EPA 200.7	10/29/2014	KC
Magnesium, Mg	UR	0.50	mg/L	0.50	EPA 200.7	10/28/2014	KC
Manganese Low		0.128	mg/L	0.005	EPA 200.7	10/24/2014	KC
Potassium, K	UR	56.7	mg/L	0.5	EPA 200.7	10/28/2014	KC
Selenium Low	0.05	< 0.005	mg/L	0.005	EPA 200.8	11/3/2014	JH
Silica	UR	106	mg/L	0.25	EPA 200.7	11/4/2014	KC
Sodium, Na	UR	392	mg/L	0.50	EPA 200.7	10/28/2014	KC
Uranium, U	30	< 5	ug/L	5	EPA 200.8	11/3/2014	JH
Metals Digestion		*			EPA 200.9-11	10/23/2014	JMS
Density		0.998	g/mL		Gravimetric	11/4/2014	JH
Nitrate (as N)		< 0.2	mg/L	0.2	EPA 300.0	10/23/2014	NC

MCL = Maximum Contamination Level
MDL = Method/Minimum Detection Limit
UR = Unregulated

Page 1 of 2

Date Report Printed: 11/7/2014 11:59:12

Laboratory Analysis Report

Sample Number: 1442245

NO FIELD TEMP GIVEN; NO TRAVEL BLANKS RCVD; Methane, Ethane, and Ethene testing were performed by Accutest Mountain States (AMS).

Test Requested	MCL	Analysis Result	Units	MDL	Method	Date Completed	Analyst
Benzene		1510	ug/L	0.5	EPA 8260B	10/28/2014	CY
Toluene		830	ug/L	0.5	EPA 8260B	10/28/2014	CY
Ethylbenzene		55.0	ug/L	0.5	EPA 8260B	10/28/2014	CY
Xylene, Total		390	ug/L	0.5	EPA 8260B	10/28/2014	CY
Methane		2.49	mg/L	0.0008	RSKSOP 175	10/27/2014	AMS
Ethane		0.399	mg/L	0.0016	RSKSOP 175	10/27/2014	AMS
Ethene		<0.0024	mg/L	0.0024	RSKSOP 175	10/27/2014	AMS
Alkalinity	UR	332	mg/L CaCO3		EPA 310.1	10/30/2014	CJS
Chloride, Cl	UR	305	mg/L	1	EPA 300.0	10/23/2014	NC
Fluoride, F	4.0	6.88	mg/L	0.10	EPA 300.0	10/23/2014	NC
Sulfate, SO4	UR	34	mg/L	1	EPA 300.0	10/23/2014	NC
pH	UR	8.8	S.U.		SM 4500-H B	10/23/2014	RME
Conductivity	UR	1,880	umhos	2	SM 2510B	10/23/2014	RME
Bicarbonate		302	mg/L		SM 2320	10/30/2014	CJS
Carbonate		29.8	mg/L		SM 2320	10/30/2014	CJS
Hydroxide		0.0	mg/L		SM 2320	10/30/2014	CJS
Resistivity		5.32	ohm*cm			10/23/2014	DS
Total Dissolved Solids	UR	1,540	mg/L	25	SM 2540C	10/28/2014	GM

MCL = Maximum Contamination Level
MDL = Method/Minimum Detection Limit
UR = Unregulated

Thank you for choosing Analytical Laboratories for your testing needs.
If you have any questions concerning this report,
please contact your client manager: James Hibbs

Page 2 of 2

Date Report Printed: 11/7/2014 11:59:12

Analytical Laboratories, Inc.
1804 N. 33rd Street
Boise, Idaho 83703
Phone (208) 342-5515

Date Report Printed: 11/21/2014 3:49:55 PM
http://www.analyticallaboratories.com
These test results relate only to the items tested.

Laboratory Analysis Report

Sample Number: 1442246

Attn: JEFF JANIK
ALTA MESA SERVICES, LP
15021 KATY FREEWAY STE 400
HOUSTON, TX 77094

Collected By: J JANIK
Submitted By: J JANIK

Source of Sample:
DJS PROP 2-14 PRODUCOD WATER

Time of Collection: 16:00
Date of Collection: 10/22/2014
Date Received: 10/23/2014
Report Date: 11/21/2014

PWS#:
PWS Name:

Field Temp: Temp Rcvd in Lab: 20.4 °C

NO FIELD TEMP GIVEN; Radiological testing was performed by Summit Environmental (SUM).

Test Requested	MCL	Analysis Result	Units	MDL	Method	Date Completed	Analyst
Gross Alpha	15 pCi	<3	pCi/L	3	EPA 900.0	11/11/2014	SUM
Gross Beta		57+/-5.8	pCi/L	4	EPA 900.0	11/11/2014	SUM

Thank you for choosing Analytical Laboratories for your testing needs.
If you have any questions about this report, or any future analytical needs, please contact your client manager:
James Hibbs

MCL – Maximum Contamination Level
MDL – Method/Minimum Detection Limit
UR = Unregulated

Page 1 of 1

ATTACHMENT U

U. **DESCRIPTION OF BUSINESS** - AM Idaho LLC is the operating subsidiary of High Mesa Holdings, LP. High Mesa Holdings, LP is a privately-held, independent exploration and production company, primarily engaged in the acquisition, exploration, development and production of oil, natural gas and natural gas liquids within the United States.

Deep Aquifer Utilization Costs

EPA NOTE: Exhibit A Addition (9/11/2018)

r

Construction Costs:			
Item #	Description	$	Basis, source
1	Drill and Case Well	$ 2,300,000	Recent well cost, includes location and short road
2	Complete with electrical submiersible pump	$ 200,000	Estimate based on current market costs
3	Install Electrical Service	$ 1,380,000	From evaporation pond estimate for 480 V for Big Willow x 3 - much more power required
4	Install Flowline	$ 2,500,000	Assume 5 miles at $500k/mile with heat traced insulated risers
5	Purchase Treating Facilities	$ 4,071,000	From Global Advantech Proposal for 60 bbl/hr - electocoagulation, activated carbon absorption, ultrafiltratioin, trickle filtration
6	Purchase and Install Tanks and Piping	$ 200,000	4 x 400 bbl, insulated, heat traced, piping insulated and heat traced
7	Install Treating Facilities	$ 180,000	Roustabout crew, welders, crane, electricians - Assume 6000/day * 30 days
8	Transfer Pump and controls	$ 110,000	from P. Negron estimate for transfer pump
9	Heat tracing	$ 50,000	Estimate
10	SCADA / Controls	$ 100,000	Estimate based on Little Willow
11	Construction Supervision	$ 90,000	30 days @ 3000
12	Commissioning	$ 155,000	Site supervision, electricians, mechanic, water disposal, water transport, hydrotesting - assume 2 weeks at 7500/day + 5 days @ 10000
	TOTAL	**$ 11,336,000**	

Facility and Well Operating Costs - monthly:			
13	Operators	$ 15,000	Assume 3 operators, operating days only
14	Electrocoaggulation electrodes	$ 500	replace every several months
15	Coagulant chemical	$ 1,260	1$/1000 gallons
16	High and low pH cleaners	$ 1,000	100 gal/month (10$/gallon
17	Sodium hypochlorite for filter disinfection	$ 50	10 gallons / month
18	Seals, valve seats, filter media,	$ 5,000	5000/month
19	Filter media and filtered and precipitated material disposal	$ 2,000	2000/month
20	Electrical Power	$ 27,000	$0.10/kWH, 500 HP
21	Instrument Technician	$ 5,000	Contract as needed
22	Mechanics	$ 5,000	Contract as needed
23	Quality control monitoring	$ 2,000	Fluid analysis and testing by 3rd party
24	Regulatory compliance	$ 3,000	Consultant / reporting / inspections / training
	TOTAL	**$ 66,810**	**$/month**

Averaged Well Workover / Maintenance Cost - monthly			
Potential for sanding or scaling up and requiring gravel pack and /or acidizing.			
	Miscellaneous workover to replace pump / acidze / replace tubing / gravel pack, etc	$ 3,125	150000 every 4 years
	TOTAL	**$ 3,125**	**$/month**

Notes:

Process for and cost of treating water from deep aquifer:
Assume 1000 Barrels of water per day
Assume Groundwater Criteria
Life of well dependent on aquifer size and boundaries and integrity of formation and tubulars.

EPA NOTE: Exhibit B Pt. 1 Addition (9/11/2018)

PROPOSAL TO ALTA MESA, USA

FOR

PACKAGED PRODUCED WATER TREATMENT SYSTEMS

Ref: GAR00768/P01/02
Date: 05/06/2017

Prepared by: Michael Levey
Global Advantech Resources Limited
Westpoint House, Prospect Park
Prospect Road, Arnhall Business Park
Westhill, AB32 6FJ
United Kingdom
Tel: +44 (0)845 519 0765

CONTENTS

CONFIDENTIALITY

This document has been prepared is submitted in confidence to Alta Mesa.

REVISION HISTORY

GAR00768/P01/02 Original proposal

1 EXECUTIVE SUMMARY

1.1 Overview

This revised proposal is presented by Global Advantech Resources Limited to Alta Mesa for the supply of packaged, integrated, automated produced water treatment systems, capable of being trailer mounted. The systems are modular and designed so that the system treatment capacity may be increased (scaled-up) by the addition of further modules in the future.

1.2 Treatment technologies selected

The technologies utilized in the produced water treatment systems have been selected to ensure effective operation, while minimizing construction and operating costs. These are:

- Electrocoagulation – highly effective for the removal of dispersed/emulsified hydrocarbons, organic and inorganic suspended solids, biological material (bacteria, larvae, algae, etc.), dissolved heavy metals and alkaline earths from water. Electrocoagulation using aluminum electrodes has been selected as the most efficient way to rapidly remove the dissolved zinc and other heavy metals from solution.
- Activated carbon absorption – to absorb remaining dissolved organic compounds, e.g. surfactants, oils and hydrocarbons.
- Ultrafiltration (the ultra filters are protected by micro filters) - to remove remaining ultrafine particulates (>0.05microns) and bacteria.
- Optional air stripping of any remaining volatile hydrocarbons.

1.3 Produced water treatment

Alta Mesa has requested a proposal for systems to treat produced water with analyses similar to those given in documents supplied together by Alta Mesa (references: 20160523 Composite Produced Water Little Willow - Idaho Analysis; 170315039_HDEC, March 2017 results; and Petroleum Hydrocarbon Testing Results) to remove the following:

- Heavy metals >95%
- Alkaline earths >95%
- Radionuclides (strontium, radium, uranium) >95%
- Oils and hydrocarbons >99%
- Suspended organic and inorganic solids >99.9%

So that it is compliant with Idaho Department of Environmental Quality Codes for reuse. The reuse application, e.g. crop irrigation, dust control, etc.; will depend upon the concentrations of monovalent salts, e.g. sodium chloride, in the produced water being treated from a particular well. If required, an additional option process module, containing a high pressure reverse osmosis system to remove these monovalent salts, may be installed (note: a high pressure reverse osmosis would produce a concentrated reject stream containing these salts, which would need disposal.)

1.3.1 Main features of the proposed produced water treatment systems

The main features of Global Advantech Resources' packaged produced water treatment systems are:

i) The produced water treatment system comprised of one or more identical water treatment subsystems (for this application, each water treatment subsystem is configured to treat 30bbl/hour of produced water flow) and is controlled by its own distributed PLCs.

ii) The produced water treatment system is built into two self-bundled, 40 feet ISO containers to permit ease of transportation and shipping and they may be mounted/operated on trailers for mobile operation.

iii) The modular design facilitates shipping and very rapid installation on site. Once located on site, the modules are installed by linking together the supplied hard wall flexible pipework and electrical/ hardened Ethernet wiring harnesses, and connecting the external electrical services and produced water inlet/treated water discharge pipework.

iv) The produced water treatment capacity installed on site is readily increased or decreased to meet production requirements.

v) When there is more than one treatment subsystem installed on site, the treatment subsystems may be configured so that if one subsystem is taken offline, e.g. for maintenance, then the remaining operational subsystem(s) automatically continue to treat the produced water flow. Two identical produced water treatment systems may be interconnected for full duty-standby operation, where both systems automatically cycle between operating and hot-standby and their master PLC control systems monitor each other and will take over automatically in the event that one system fails.

Installation of system at Hides, Papua New Guinea

Drilling slops and wastewater treatment system

System internals

Containerised system used to treat waste water and produced water from rainforest oil and gas drilling operations in the Southern Highlands of Papua New Guinea

2 TREATMENT TECHNOLOGIES

2.1 Process technology selection

Several technologies are incorporated to ensure that the packaged system is able to treat produced waters with varying analyses without requiring operator intervention:

- Electrocoagulation
- Dissolved air flotation/sedimentation
- Multimedia and activated carbon filtration
- Micro and ultrafiltration
- Optionally, air stripping with carbon capture to remove any residual volatile hydrocarbons

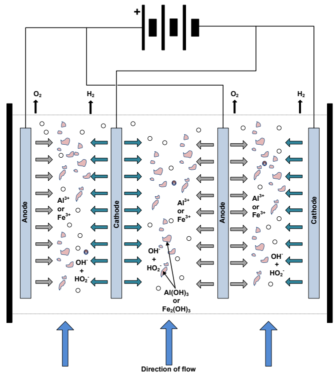
2.1.1 Electrocoagulation

Electrocoagulation is a continuous flow, low energy consumption, electrochemical process for the treatment of wastewater, and effluent arising from many sources, whether for discharge to the environment or for re-use/recycling within industrial processes. It is a highly cost effective and efficient process to treat and remove many contaminants/pollutants from water, including:

- Fats, oils and greases
- Organic and inorganic suspended solids
- Proteins, starches and other organic polymers
- Emulsified/dispersed oils and hydrocarbons
- Biological material, e.g. bacteria, algae, and larvae
- Alkaline earth metals such as calcium, which causes water hardness
- Heavy/toxic metals, e.g. copper, chromium, etc.
- Radionuclides, e.g. strontium, radium, uranium, lead, etc.

2.1.1.1 Electrocoagulation process

Electrocoagulation cells consist of a number of pairs of parallel metal plate electrodes separated by a few millimeters with a low voltage applied at high current densities. The current flowing between the electrodes destabilizes the electrical charges within the fluid, and maintains the particles in suspension, e.g. clays, and emulsions/micro-emulsions of hydrocarbons and insoluble organic compounds. The particulates then coagulate together into flocs. The hydrocarbons and insoluble organic compounds coalesce into larger droplets and rise in the cells. Electrochemical reactions at the electrodes produce very fine H_2 and O_2 gas bubbles and highly chemically reactive hydroxyl OH^- and superoxide HO_2^- radicals. The gas bubbles promote the flotation of coagulated solids and coalesced hydrocarbons, etc. The hydroxyl and superoxide radicals cause the precipitation of hydroxides of heavy metals and the breakdown of many soluble organic molecules.



i) **Most efficient solution.** Electrocoagulation using aluminum electrodes has been selected as the most efficient way to rapidly remove the dissolved zinc and other heavy metals from solution. Removal of zinc and other heavy metals is typically >95% using one stage of electrocoagulation with aluminum electrodes and >98% using two stages of electrocoagulation.

ii) **Additional advantages.** Electrocoagulation offers a distinct advantage, since in addition to the removal of zinc and other heavy metals; electrocoagulation will remove the majority of dispersed/emulsified oil and hydrocarbons, suspended organic matter and particulates, larger organic molecules and polymers, biological material (algae, bacteria, larvae, etc.) and alkaline earth metals.

iii) **Lower OPEX than other standard methods.** The electrocoagulation systems offer lower operating costs (OPEX) than multi-effect evaporation or mechanical vapor recompression units for the removal of concentrations of dissolved heavy salts from water.

2.1.1.2 Electrocoagulation process performance

Electrocoagulation processes are able to remove (and recover) many contaminants from waste and polluted water streams including:

	One pass	**Two passes**
Suspended solids	>95%	>99%
Emulsified/dispersed hydrocarbons	>95%	>99%
Bacteria/algae/larvae	>95%	>99%
Heavy metals	>95%	>99%
Calcium, magnesium	>90%	>95%
Arsenic	>90%	>95%
Biological oxygen demand	>90%	>95%
Chemical oxygen demand	>90%	>95%

2.1.1.3 Electrocoagulation system features and benefits

The proprietary electrocoagulation system design includes a number of unique and innovative design features to ensure effective and continuous operation:

i) The cells use optimized low voltage, high current electrochemistry, with a large number of parallel plate electrodes for efficient operation.

ii) The profile of the electric current applied to the electrodes is optimized to prevent metal electrode passivation (development of an oxide layer, which acts as an insulator preventing cells from continuing to operate) and monitors electrode plate wear.

iii) Large electrode contact area within electrocoagulation cells for efficient operation.

iv) The cells have an optimized water flow hydrodynamics to ensure that the electrodes are evenly consumed and that produced flocs are swept out of the cells

v) The cells incorporate an automated backwash facility to minimize maintenance.

vi) The cells use upward flow to sweep out all hydrogen and oxygen bubbles produced during the process to flotation/sedimentation tanks and to prevent sediment build-up in the cells.

vii) All systems utilize multiple PLCs, which are programmed to control the electrocoagulation cell power supplies so that the systems are able to run in full automatic mode.

viii) Systems automatically integrate currents applied to the electrodes against time applied to calculate the wear on the cell electrodes and alarm when the electrodes are due for replacement.

ix) Scalable treatment capacity throughput through connecting cells in parallel.

x) The electrodes are mounted in carrier cartridges enabling rapid replacement.

xi) Multi-cell configurations enable a single cell to be taken off-line for maintenance.

xii) All cells are mounted with interlocks to prevent access during operating.

xiii) Minimization of the production of waste by-products – 80% less hydrated floc volumes compared to chemical treatment.

2.1.2 Dissolved air flotation/sedimentation

The electrocoagulation cells discharge into a dissolved air flotation/sedimentation tank, which has an automatic floc scraper and floc/sediment discharge pump, to remove all of the coagulated particulates and compounds precipitated out from solution (heavy metals, alkaline earths, etc.).

2.1.3 Multimedia filtration

A 5 microns multimedia filter is installed after the dissolved air flotation/sedimentation tank to protect the following process stage from any flocs/sediments that might overflow.

2.1.4 Activated carbon

Activated carbon filters contain constrained activated carbon granules and have high absorption capacity for the removal of many organic compounds, including surfactants, biological compounds, polymers, etc., from water pumped through them. Activated carbon filtration is included to absorb the majority of hydrocarbons that might remain in the water after the electrocoagulation process and to further reduce to the concentrations of molecules giving rise to BOD (biological oxygen demand) that have not been completely removed in the preceding treatment stages.

2.1.5 Microfiltration and ultrafiltration

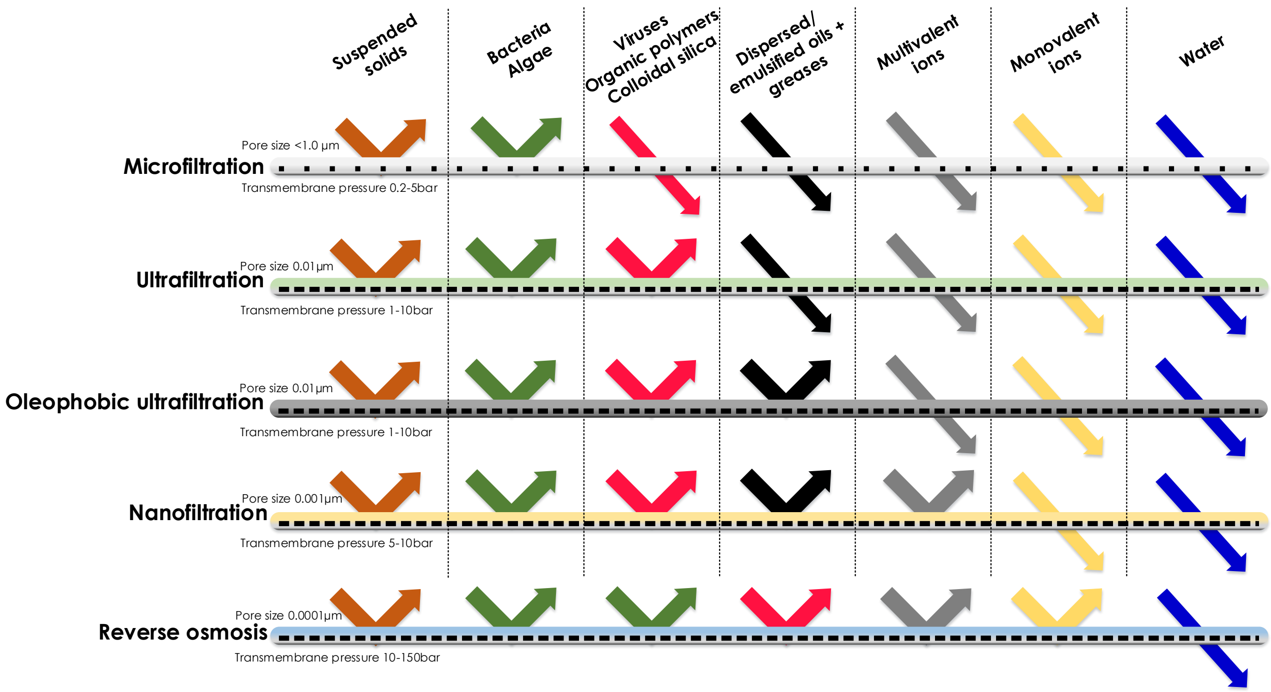
2.1.5.1 Membrane selection

Two stages of membrane filter are installed in series:

i) Microfiltration membranes to remove particulates above 1.0 microns in size, are used to remove the larger suspended particulates that may be present in the produced water to the protect oleophobic ultrafiltration membranes

ii) Highly oleophobic ultrafiltration membranes to remove the dispersed/emulsified crude oil hydrocarbons present in the produced water. These membranes are made from membranes are manufactured from a polyacrylonitrile polymer and have been engineered to extremely hydrophilic/oleophobic so that they are not fouled by oils and greases (conventional membranes are manufactured from materials that oleophilic). These ultrafiltration membranes have pore sizes of typically 0.02 µm (micron), which prevent particulates and any residual dispersed/emulsified oil and grease droplets from passing through and are rejected.

The membrane filters are made from bundles of hollow membrane fibers spirally wound with support structures and welded into carrier housings to form membrane cartridges. The different types of polymeric filter membrane, their filtration characteristics and operating pressure ranges are summarized in the following diagram.



(It should be noted that ultrafiltration, Nano filtration and reverse osmosis reject part of the water stream being treated, which requires to be re-circulated for additional treatment.)

2.1.6 Air stripping with carbon capture

Optionally, an air stripping column with activated carbon capture of volatile hydrocarbons may be added to the packaged system, to ensure that all volatile hydrocarbons: benzene, toluene, etc., are removed from the water prior to discharge from the packaged treatment system.

3 PRODUCED WATER TREATMENT SYSTEM DESIGN

3.1 System design overview

The packaged produced water treatment system is built as two modules, comprising of 2 40 feet by 8 feet ISO-sized containers to facilitate mounting on standard 40 feet trailers for ease of mobility and system transportation, handling and rapid installation on site. The modules are designed so that they may be operated whilst on the trailers of or stacked two high to minimize the system footprint on site.

3.2 30bbl/hour produced water treatment system components

i) Two 40 feet ISO-sized containers with integral bunds.

ii) System buffer tank with pH monitoring and chemical dosing for pH control.

iii) Five in total through flow electrocoagulation cells, each one fitted with aluminum electrodes and connected in parallel (the electrodes in each electrocoagulation cell are fitted into removable cartridges to facilitate rapid change of electrodes). (

iv) Inline mixer for the addition of coagulant to accelerate the coagulation of any suspensions of heavy metal hydroxides, alkaline earth hydroxides/insoluble salts, dispersed/emulsified oils/hydrocarbons, organic particulates and matter, etc., removed from solution by the electrocoagulation process.

v) Dissolved air flotation/sedimentation tank to remove coagulated suspensions and precipitated sediments arising from the electrocoagulation process, with white water recirculation pumps, automated scrapers and automated floc/sediment dump valves.

vi) Buffer tank to balance the flow of the water being treated between the electrocoagulation stage and the filtration stage.

vii) Pumps.

viii) Multimedia filter.

ix) Activated carbon filter.

x) Micro filters and oleophobic ultra filters to remove any remaining ultrafine, neutrally buoyant particulates, oil/hydrocarbon droplets to >0.02 microns in size.

xi) Automated filter backwash system to maintain performance of the multimedia, micro and ultra filters.

xii) Instrumentation including conductivity sensors, flow and level sensors, pressure sensors on the electrocoagulation cells, etc.

xiii) Distributed PLC network connected via hardened Ethernet to master PLC and color HMI.

xiv) Electrocoagulation cell power-supply subsystems.

xv) Filter press and screw conveyor for discharge.

xvi) Valves and pipework.

xvii) Electrical services.

xviii) Standard documentation and drawings pack.

3.3 Materials used for construction of treatment systems

The components and materials selected for the fabrication and construction of the packaged produced water treatment systems have been chosen for their resistance to corrosion and longevity.

i) The modules (frames and containers) are steel, coated with an epoxy paint system for corrosion protection in a marine environment.

ii) Tanks internal to the packaged systems, including process buffer tanks and dissolved air flotation/sedimentation tanks are fabricated from polymer composites, as are the multimedia and carbon filter, micro and ultra filter, and electrocoagulation cell housings.

iii) All pipework and valves internal to the modules are made from corrosion resistant post-chlorinated PVC (cPVC) and are physically protected against mechanical knocks and abrasions.

iv) The initial system feed tank is fabricated from glass-lined carbon steel.

v) All external water treatment module interconnection pipework is made using reinforced, flexible hard wall rubber, as appropriate to the design.

3.4 Operation of produced water treatment system

i) Produced water is pumped into the initial system buffer tank, where its pH is adjusted.

ii) The water is then pumped through the parallel array of electrocoagulation cells.

iii) Coagulant is mixed into the water exiting each set of electrocoagulation cells, prior to entering the dissolved air flotation/sedimentation tank (DAF tanks) (one in each subsystem) to accelerate the rate of removal heavy metal hydroxides, oils, hydrocarbons, suspended/organic matter, alkaline earth metals, etc., separated/precipitated out from solution by the electrocoagulation process.

iv) The separated/precipitated material collects as flocs and sediments in the DAF, which are automatically periodically pumped to the filter press, where they are dewatered and discharged via a screw conveyor into skips for disposal in accordance with state regulations.

v) The water being treated overflows from the DAF tank and into the process buffer tank.

vi) From the buffer tank, the water is pumped via the multimedia and granulated activated carbon filter, then through the micro and ultra filters before being discharged from the system via the activated carbon filters – the multimedia filters, micro and ultra filters are automatically periodically backwashed and the backwash solutions are pumped to the filter press.

vii) The filtrate liquid from the filter press is returned to the main system buffer/balancing tank for further treatment.

viii) Optionally, an air-stripping column may be installed prior to discharge from the system to ensure that any volatile hydrocarbon residuals are removed from the water.

3.5 Operational procedures

The packaged treatment system is fully automated under PLC control, with sensors to give the necessary feedback to the master PLC control programs, e.g. pressure, flow, conductivity, position of valve, etc. The initial process set points for the operation, e.g. differential pressures to automatically trigger backwashing of the multimedia, micro and ultra filters, are entered into the control processor via the HMI during the operational testing and commissioning stages. These points may be adjusted later based upon experience, to minimize operational maintenance requirements. Once all the chemical reservoirs are fully replenished, etc., the packaged treatment system is started up and operates automatically, only requiring monitoring/response to alarm conditions, in addition to normal operating maintenance.

Whilst the packaged treatment system is fully automated, it is recommended that one operator is available at all times to ensure that all chemical reservoirs are replenished when the systems flag warn that levels are low and run the scheduled cleaning procedures, etc.

3.6 Normal operational maintenance

The packaged treatment system has been designed so that there will be no requirement for external specialist technicians/experts for the normal maintenance of the packaged treatment system. Normal operational maintenance procedures are to be carried out by Alta Mesa's trained operators/engineers.

3.7 Requirements on site

Electricity requirement for the treatment system is 380-415VAC, 50—60Hz and will have a peak load of approximately 50KW.

3.8 Consumables

i) Aluminum electrode plate sets for the electrocoagulation cells (estimate replacement approximately every 8-16 weeks) – the electrode wear is automatically monitored and an alarm is flagged when the electrodes in each electrocoagulation subsystem require examination and replacement.

ii) Coagulant to aid flocculation of charge neutral, neutrally buoyant ultrafine particulates after electrocoagulation and sodium hydroxide solution for pH control.

iii) High and low pH cleaners for the micro and ultra filters.

iv) Sodium hypochlorite or sodium metabisulphite solution for periodic disinfection of micro and ultra filter membranes.

3.9 Facility for remote diagnostics/program updating

An optional interface can be installed into the master PLC, which would offer a number of important benefits:

i) It would enable remote diagnostics to be carried out prior to an engineer visiting site or instructions issued to an operator on how to correct an issue with a system.

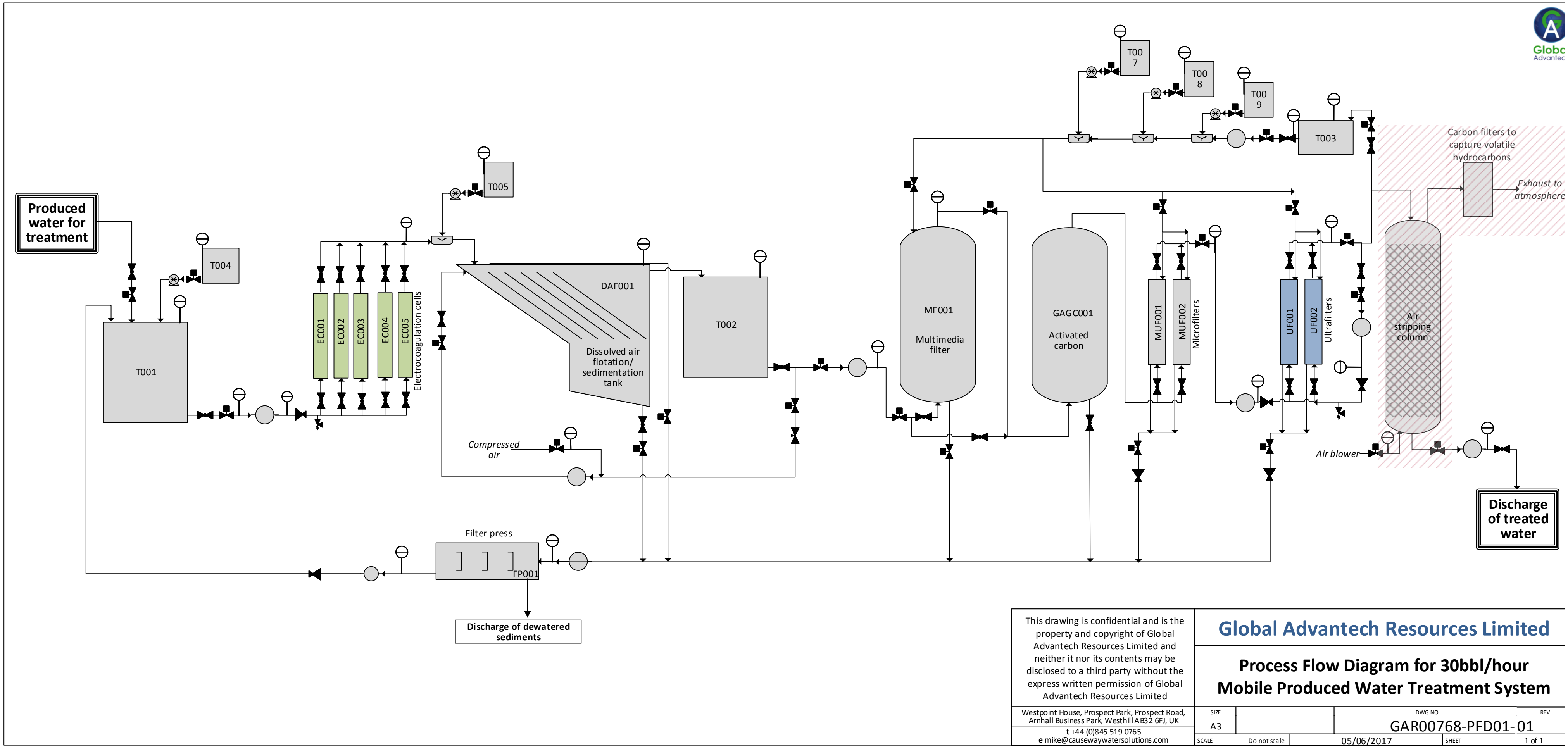
ii) Required program updates may be installed without the necessity of an engineer-visiting site.

3.10 Future expansion

The packaged produced water treatment system is modular and may be expanded by the addition of further 30bbl/hour capacity treatment modules to meet the future requirements of Alta Mesa.

The system includes a master PLC with HMI for automation, monitoring and control, and a number of slave PLC's to control the individual system process, which are connected to the master PLC via hardened Ethernet and ensure that system cabling is kept to a minimum. This design permits flexibility in operation and will enable further produced water treatment modules to be connected up and controlled by the master PLC.

3.11 Process flow diagram for 30bb/hour produced water treatment system



4 COMMERCIAL OFFER

4.1 Financial detail

	Description	Item Price
1	30bbl/hour produced water treatment system, comprising: • 2 number ISO (40 feet by 8 feet) epoxy painted containers/frames, with integral bunds (modules). • System buffer tank with pH monitoring and chemical dosing for pH control. • Five in total through flow electrocoagulation cells, each one fitted with aluminum electrodes and connected in parallel (the electrodes in each electrocoagulation cell are fitted into removable cartridges to facilitate rapid change of electrodes). (• Inline mixer for the addition of coagulant to accelerate the coagulation of any suspensions of heavy metal hydroxides, alkaline earth hydroxides/insoluble salts, dispersed/emulsified oils/hydrocarbons, organic particulates and matter, etc., removed from solution by the electrocoagulation process. • Dissolved air flotation/sedimentation tank to remove coagulated suspensions and precipitated sediments arising from the electrocoagulation process, with white water recirculation pumps, automated scrapers and automated floc/sediment dump valves. • Buffer tank to balance the flow of the water being treated between the electrocoagulation stage and the filtration stage. • Pumps. • Multimedia filter. • Activated carbon filter. • Micro filters and oleophobic ultra filters to remove any remaining ultrafine, neutrally buoyant particulates, oil/hydrocarbon droplets to >0.02 microns in size. • Automated filter backwash system to maintain performance of the multimedia, micro and ultra filters. • Instrumentation including conductivity sensors, flow and level sensors, pressure sensors on the electrocoagulation cells, etc. • Distributed PLC network connected via hardened Ethernet to master PLC and color HMI. • Electrocoagulation cell power supply subsystems. • Filter press and screw conveyor for discharge. • Valves and pipework. • Electrical services. • Standard documentation and drawings pack.	**For operation in the presence of flammable vapors ATEX Zone 2/ ExD USD 3,203,000**

	Description	Pricing
2	Air stripping column with blowers and carbon vapor capture	**USD 122,000**
3	Engineers for HAZOP/HAZID and design review meetings, installation, commissioning, training, call out, etc., per day man day from date of departure to site to date of return to UK base, plus direct expenses at cost plus 15%	**USD 900 per man per day**
4	Annual spares holding	**TBA Subject to agreement with Alta Mesa**
5	Maintenance support contract – excludes engineers' time and engineers' direct expenses and replacement components outside manufacturers' warranties (all warranties are on a return to manufacturer basis and exclude freight/immediate replacement costs.). Levels of support and engineer availability service levels to be agreed	**TBA Subject to agreement with Alta Mesa**
6	Remote diagnostic facility to support maintenance	**USD 16,940**

4.2 Other terms and conditions

i) All prices shown in United States Dollars (USD).

ii) Above prices exclude UK VAT (not applicable for exported systems) and shipping, delivery to site, site preparation, lifting, connection of electrical and other site services to the system and any Customs taxes, import duties and other applicable local taxes.

iii) Payment terms to be agreed.

Proposed	
15%	On Contract acceptance
15 %	Completion of Design/Drawings
30 %	Procurement of Long Lead items
30 %	System completion ready for Delivery
10 %	Collection for Shipment

iv) Proposed system is designed and built in accordance with sound engineering practice, as an option other standards can be used if required.

v) Documentation and drawings are in accordance with Global Advantech Resources Limited's usual practice, as options additional documentation and drawings can be prepared and to different standards if required.

vi) Ready to ship, 18-24 weeks after confirmation of order.

vii) Rental Options may be available as an alternative to purchase for the supply the produced water treatment systems and ancillary plant with a minimum rental period of 2 years.

EPA NOTE: Exhibit C Addition (9/11/2018)

BUSINESS CASE
WATER TREATMENT SYSTEM VERSUS
EVAPORATION PONDS

FOR

ALTA MESA HOLDINGS LP
ALTA MESA IDAHO LLC
OIL & GAS OPERATIONS

Ref: GAR00775-BCSE01
Date: 17 August 2017

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CONTENTS

REVISION HISTORY

GAR00775-BCSE01 Original overview

CONFIDENTIALITY

This document is submitted to Alta Mesa Holdings LP in confidence.

1 EXECUTIVE SUMMARY

1.1 Overview

Alta Mesa Holdings LP is a privately held company engaged in onshore oil and gas acreage acquisition, exploitation and production and is currently planning to increase its production in Idaho. As part of its planning for this increase in production Alta Mesa is investigating how to minimize the costs associated with the treatment and disposal of the volumes of water that will be produced.

Global Advantech Resources Limited has prepared this financial business case to help Alta Mesa with its selection of a suitable technology to treat produced water arising from its wells in Idaho. This business case compares the capital and operating costs of:

i) Building and operating a new produced water evaporation pond in Idaho and transferring all of the produced water coming from the wells in Idaho to the evaporation pond. Heavy metals and naturally occurring radioactive materials (NORM) will concentrate in the sludge build-up at the bottom of the pond, which have to be periodically pumped into a tanker and taken to a hazardous waste facility for stabilization and disposal.

ii) Using a packaged mobile treatment system purchased from Global Advantech Resources Limited, moved between the well sites to treat the produced water from the wells, which is then discharged to the local environment or other beneficial use. This treated water is suitable to be used for the restoration/development of local wetlands and/or used for irrigation, benefitting the local community. Also, the heavy metals and NORM are contained in dewatered solids that are discharged by the system into dumpsters, which are then sealed and transferred to a hazardous waste facility.

1.2 Summary

The difference in the total cost per barrel for the disposal/treatment of produced water for the two options is sizeable. The cost calculations include initial capital expenditure, operating, transportation, waste disposal and environmental monitoring to ensure compliance with State permits, and are included in detail in Section 2. The total costs are:

i) Using an evaporation pond: $6.10 per barrel of produced water, with an estimated initial capital outlay of just over $10.7million to cover land acquisition, construction and permitting costs – this excludes site decommission/restoration costs and disposal of contaminated materials (liners, soil, etc.) at some time in the future.

ii) Using the packaged mobile treatment system: $2.98 per barrel of produced water, with a purchase cost, including estimated system permitting of a little under $4.4million.

(The cost of capital, i.e. interest, has not been included in these calculations and if included, the operating cost comparison for the treatment of the produced water per barrel would even more favor the packaged mobile treatment plant.)

1.3 Permitting of mobile water treatment systems in Idaho

Idaho Department of Environmental Quality stated in a telephone conversation, on Monday 24th July, that they have previously permitted mobile water treatment systems and subject to understanding the technologies utilized and the performance of mobile produced water treatment system proposed by Alta Mesa, they would be prepared to permit such a system.

2 FINANCIAL COMPARISON TO DISPOSAL/TREATMENT OPTIONS

2.1 Evaporation pond in Idaho

The following evaporation pond construction and operation costs have been estimated using construction data and inflation-adjusted costs from the US Bureau of Reclamation for New Mexico. The evaporation pond capacity has been adjusted to allow for reduced average relative rate of water evaporation and increased average annual rainfall in Idaho compared to New Mexico. Land acquisition, engineering design, construction and environmental permitting costs are included, it is assumed that the pond will have to be constructed with two liners separated with at least 2 feet of compacted earth, for environmental protection and monitoring boreholes will have to be drilled around the pond. Other assumptions include that the produced water will need to be tankered an average of 20 miles from well-site to the evaporation pond and that sludges that collect at the bottom of the pond will have be tankered to US Ecology's site south of Boise for disposal as hazardous waste. It is to be noted that these sludges will contain both heavy metals and NORM.

2.1.1 *Estimated capital and operating costs for a produced water evaporation pond in Idaho*

Evaporation pond for the disposal of 60bbl/hour of produced water		*New Mexico base costs*	*New Mexico 60bbl/hr.*	**Idaho 60bbl/hr.**	**Idaho per bbl**
Relative average evaporation rate of water		*1*	*1*	0.48	
Annual rainfall (mm)		*370*	*370*	481	
Adjustment for annual rainfall in Idaho				1.30	
Evaporation capacity (US gallons/day)		*10,000,000*	*60,480*	60,480	
Evaporation capacity (bbl/day)		*238,095*	*1,440*	1,440	
Required evaporation pond area (acres)		*2,323.0*	*14.0*	**38.2**	
Estimated total land area requirement (acres)		*3,162.0*	*19.2*	**52.2**	
Land cost		*$59,580,857*	*$360,345*	$979,672	
Earthworks		*$45,561,831*	*$275,558*	$749,161	
Liner		*$192,156,275*	*$1,162,161*	$3,159,575	
Other costs (includes monitoring wells, etc.)		*$28,449,100*	*$172,060*	$467,781	
Subtotal		*$337,668,900*	*$1,970,124*	$5,356,190	
Idaho DEQ/NEPA	10%	*$33,766,890*	*$197,012*	$535,619	
Engineering	20%	*$67,533,780*	*$394,025*	$1,071,238	
Mobilization	5%	*$16,883,445*	*$98,506*	$267,810	
Construction management	25%	*$84,417,225*	*$492,531*	$1,339,048	
Contingencies	40%	*$135,067,560*	*$788,050*	$2,142,476	
Total evaporation pond construction cost		*$675,337,800*	*$3,940,249*	**$10,712,381**	
Effective evaporation pond construction cost per year (spread over 25 years)				$428,495	
Effective evaporation pond construction cost per barrel (spread over 25 years)					$0.82

Evaporation pond for the disposal of 60bbl/hour of produced water		*New Mexico base costs*	*New Mexico 60bbl/hr.*	**Idaho 60bbl/hr.**	**Idaho per bbl**
O&M					
O&M costs		*$4,071,635*	*$98,501*	$267,795	
Environmental monitoring costs, including emissions and borehole sampling and analysis			*$49,250*	$133,898	
Total O&M per year			*$147,751*	$401,693	
O&M cost per barrel					$0.76
Water transport to evaporation pond					
Number of barrels per year	525,600				
Transport to evaporation pond per bbl per mile	$0.20				
Maximum liquid volume transported (bbl)	157				
Number of loads	3,348				
Average distance transported (miles)	20				
Annual transportation cost				$2,102,400	
Average transportation cost of produced water per barrel					$4.00
Sludge disposal					
TDS + TSS (mg/L)	1,440				
Solids produced on evaporation/bbl (Kg)	0.23				
Solids produced per day (Kg)	330				
Effective sludge produced at bottom of pond (15% solids) (Kg)	2200				
Sludge volume produced per day (cu. yds.)	2.62				
Sludge produced per year for disposal (cu. yds.)	955				
Cost for disposal at US Ecology per cu. yd.	$225.00				
Total cost for disposal of sludge				$214,832	
Load per tanker (cu. yds.)	39				
Number of tanker loads of sludge to US Ecology per year	25				
Tanker cost per cu. yd. per mile	$0.80				
Distance to transport sludge (miles)	80				
Total tanker hire cost per year				$61,108	
Total sludge disposal per year				$275,940	
Sludge disposal per barrel					$0.53
Total treatment cost for evaporation in made ponds per barrel of produced water					**$6.10**

2.1.2 Sources of data used for the calculation of construction costs for the evaporation pond

i) Preliminary Analysis of a Conceptual Wetland System for Managing Membrane Concentrate, CH2M Hill, March 2008

ii) UEC Water Supply Plan – Support Document, Chapter 9 Water Quality and Treatment, 2004

iii) Engineering Design Guidelines for Construction of Waste Storage/Disposal Ponds (Revised 10-90) New Mexico Oil Conservation Division

iv) Boysen, J.E., J.A. Harju, B. Shaw, M. Fosdick, A. Grisanti, and JA. Sorensen, 1999, "The Current Status of Commercial Deployment of the Freeze Thaw Evaporation Treatment of Produced Water," SPE 52700, presented at SPE/EPA 1999 Exploration and Production Environmental Conference, Austin, TX, March 1-3.

v) Boysen, D.B., J.E. Boysen, and J.A. Boysen, 2002, "Creative Strategies for Produced Water Disposal in the Rocky Mountain Region," presented at the 9th International Petroleum Environmental Conference, Albuquerque, NM, Oct. 22-25. Available at http://ipec.utulsa.edu/Conf2002/boysen_89.pdf [PDF-external site].

vi) Nowak, N., and J. Bradish, 2010, "High Density Polyethylene (HDPE) Lined Produced Water Evaporation Ponds," presented at the 17th International Petroleum and Biofuels Environmental Conference, San Antonio, TX, August 31 – September 2. Available at http://ipec.utulsa.edu/Conf2010/Powerpoint%20presentations%20and%20papers%20received/Nowak_83_received9-8-10.pdf [PDF-external site].

vii) Puder, M.G., and J.A. Veil, 2006, Offsite Commercial Disposal of Oil and Gas Exploration and Production Waste: Availability, Options, and Cost, prepared for U.S. Department of Energy, National Energy Technology Laboratory, Aug., 148 pp. Available at http://www.evs.anl.gov/pub/dsp_detail.cfm?PubID=2006 [external site]

viii) Produced Water Disposal by David Simpson, PE MuleShoe Engineering

ix) High Density Polyethylene (Hdpe) Lined Produced/Flow-Back Water Evaporation Ponds, Neil C. Nowak, Pe, SCS Engineers, USA

x) EPA/600/R-09/132 October 2009 Measurement of Emissions from Produced Water Ponds: Upstream Oil and Gas Study #1 Final Report by Eben Thoma Air Pollution Prevention and Control Division National Risk Management Research Laboratory

xi) ANL/ESV/R-09/1 Produced water management and practices in the United States Argonne National Laboratories

xii) U.S. Produced Water Volumes and Management Practices in 2012 Groundwater Protection Council

xiii) Waste Treatment in the Process Industries edited by Lawrence K. Wang, Yung-Tse Hung, Howard H. Lo, Constantine Yapijakis

xiv) 3 Western Regional Climate Center – Evaporation Station Data https://wrcc.dri.edu/htmlfiles/westevap.final.html

xv) https://www.currentresults.com/Weather/US/average-annual-state-precipitation.php

xvi) United States Bureau of Statistics Inflation Data

2.2 Packaged mobile produced water treatment system

The capital purchase price for the produced water treatment system is as per Global Advantech Resources' proposal to Alta Mesa, reference: GAR00775-P01-01, dated 7th July 2017, together the cost for three long, flat bed trailers on which the treatment system will be mounted and the environmental permitting costs for the mobile system. All of the other operational costs, including transfer of dewatered solids containing the heavy metals and NORM from the produced water and treatment at US Ecology's hazardous waste facility are included.

2.2.1 Cost of mobile water treatment plant

Mobile 60bbl/hour packaged produced water treatment plant operating in Idaho		**Cost per year**	**Cost per hour**	**Cost per bbl**	**Total cost per bbl**
Capital cost of produced water treatment plant		$4,071,000			
Capital cost of 3 long flatbed trailers		$120,000			
Environmental permitting for mobile treatment plant for use at well sites in Idaho		$162,840			
Effective cost per year, depreciated over 7 years		$621,977			
Initial capital cost of produced water treatment system		**$4,353,840**			
Effective cost per hour, depreciated over 7 years			$71.00		
Effective cost per barrel, depreciated over 7 years					$1.18
O&M costs					
Maintenance					
Annual maintenance @ 5% of capital cost		$203,550			
Maintenance cost per hour			$23.24		
Maintenance cost per barrel				$0.39	
Electricity					
Cost/KWh	$0.077				
System consumption (KW)	120				
Electricity consumption per year		$80,942			
Electricity cost per hour			$9.24		
Electricity cost per barrel				$0.15	
Chemical consumption					
Average chemical consumption per year		$12,527			
Average cost of chemical consumption per hour			$1.43		
Average cost of chemical consumption per bbl				$0.02	
Movement of mobile packaged plant between sites					
Cost per tractor unit per hour	$105.00				
Number of tractor units	3				
Hours per movement	2				
Tractor cost per relocation	$630.00				
Average mobilization cost per relocation	$936.00				
Number of movements per year	50				
Total system movement cost per year		$78,300			
Average system movement cost per bbl				$0.15	

Mobile 60bbl/hour packaged produced water treatment plant operating in Idaho		**Cost per year**	**Cost per hour**	**Cost per bbl**	**Total cost per bbl**
Laboratory testing of treated water for compliance monitoring					
Cost per sample analysis	$120.00				
Courier cost	$50.00				
Number of samples per year	200				
Total sample analysis cost per year		$34,000			
Sample cost per bbl				$0.06	
Operator					
Operator cost per year		$360,000			
Operator cost per hour			$60.00		
Operator cost per bbl				$1.00	
Total O&M cost per year		$769,319			
Total O&M cost per bbl					$1.77
Solids (filter cake) disposal					
Total suspended solids (mg/L)	20				
Dissolved solids (heavy metal salts, alkaline earth metal salts)	200				
Solids produced at filter press /bbl (Kg)	0.0420				
Solids produced per day (Kg)	60.48				
Filter cake (40% solids) (Kg)	151.20				
Solids produced per year for disposal (tonnes)	55				
Solids produced per year for disposal (short tons)	61				
Cost for disposal at US Ecology per short ton	$225.00				
Total cost per year for disposal at US Ecology		$13,725			
Cost per bbl for disposal at US Ecology				$0.0261	
Load per truck (short tons)	27				
Number of truck loads per year	2				
Time for truck + driver hire (hours)	4				
Truck hire per hour	$117.00				
Total truck hire per year		$936			
Cost of truck hire per bbl				$0.0018	
Total solids disposal cost per year		$14,661			
Total solids disposal cost per bbl					$0.028
Total treatment cost per bbl of produced water with packaged mobile system, including disposal of wastes produced					**$2.98**

Global Advantech

3 SUSTAINABLE BUSINESS, RESILIENT OPERATIONS & THE ENVIRONMENT

Other cost and risk factors can impact business operations and shareholder value.

3.1 Protection of the environment and the fossil fuel industry

Many global conservation organizations recognize there will be no immediate discontinuation of energy production of fossil fuels. However, there is universal advocacy that oil and gas production be conducted in an environmentally responsible manner, taking into consideration the protection of freshwater resources and sound waste prevention and disposal standards for the benefit of all stakeholders.

The State of Idaho is already thinking in these terms:

3.2

47-311[1] PUBLIC INTEREST.

"It is declared to be in the public interest to foster, encourage and promote the development, production and utilization of natural resources of oil and gas in the state of Idaho ***in such a manner as will prevent waste****; to provide for uniformity and consistency in the regulation of the production of oil and gas throughout the state of Idaho; to authorize and to provide for the operations and development of oil and gas properties in such a manner that a greater ultimate recovery of oil and gas ... and that the correlative rights of all owners be fully protected; to encourage, authorize and provide for voluntary agreements for cycling, recycling, pressure maintenance and secondary recovery operations in order that the greatest possible economic recovery of oil and gas may be obtained ...[so] the land owners, the royalty owners, the producers and the general public may realize and enjoy the greatest possible good from these vital natural resources.*

Section 2. 47-315[2] AUTHORIZATION OF COMMISSION.

"The commission is authorized and it is its duty to regulate the exploration for and production of oil and gas, ***prevent waste of oil and gas*** *and to protect correlative rights, and otherwise to administer and enforce this act. It has jurisdiction over all persons and property necessary for such purposes.* ***In the event of a conflict, the duty to prevent waste is paramount****.*

[1]Amended from previous Section 3. 47-315; [2]Amended from previous Section. 47-319. The Oil and Gas Conservation Act, House Bill No. 301, By Ways and Means Committee, House of Representatives, 64th Legislature, First Regular Session, 2017. All references are amendments to the Idaho Code.

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m Environmental-Social-Governance (ESG) considerations[i]

All is not 'doom-and-gloom' for oil and gas producers when considering environmentally responsible production. Globally reputable universities, financial institutions and seasoned investment firms continue to confirm the business case for compliance with Environmental-Social-Governance best practices.

- 88% of companies with solid ESG practices ***showed better operating performance*** of the firms, which translates ultimately into cash flow.
- 90% of companies showed ***lower cost of capital***.
- ***Managing environmental impact is a very important element of business strategy for firms in the fossil fuel and transportation industries***.
- Firms making investment in material ESG issues ***outperformed peers*** in terms of profit margin growth.

3.3 Pro-active engagement with Idaho communities[ii]

Idaho water utilities are already facing regulatory infringements from contaminants found in drinking water supplies. The latest figures show contaminants in drinking water in Payette, Idaho and the surrounding communities include: Chromium (total), Radium, combined (-226 and -228), Radium-228 and Uranium.[iii] While some of these contaminants are naturally occurring, they've also been linked to pollutants from industry, including oil and gas.

3.4 Mitigating reputation risk

Ignoring ESG factors in business operations can also have costly, unintended consequences for companies, including non-compliance penalties, cleanup and remediation costs – and not insignificantly, reputation risks.

While it is inherently difficulty to quantify, a company's reputation is recognized to be a strategic asset, which produces "*tangible benefits with the potential of creating value.*"[iv] Reputation risk for oil and gas producers can come from numerous sources. But obvious threats include:

- Louder and more volatile community and environmental activists
- Increasing demands from shareholders seeking to protect investments against the impact of unaccounted for ESG factors (particularly in extractive industries)
- Disruption of operations
- Environmental disasters and the effects on wildlife, water quality and local quality of life
- Competition for freshwater supplies, especially in drought years
- Threats to the protection of drinking water quality

The Global Advantech water treatment plant would enable Alta Mesa to economically treat the produced water from its operations in Idaho in an environmentally sound manner. This ESG-based decision is proactive and would help to enhance relations with state regulators, local governments and communities and all water-users. It also provides a clear message to all stakeholders of its commitment to sustainable operations and taking progressive action to optimize shareholder value.

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[i] Points 1 and 2: Data from Oxford and Arabesque Investors: *From the Stockholder to the Stakeholders: How Sustainability can Drive Financial Performance, Updated* version, Sustainability Meta-Study (2015) and Deutsche

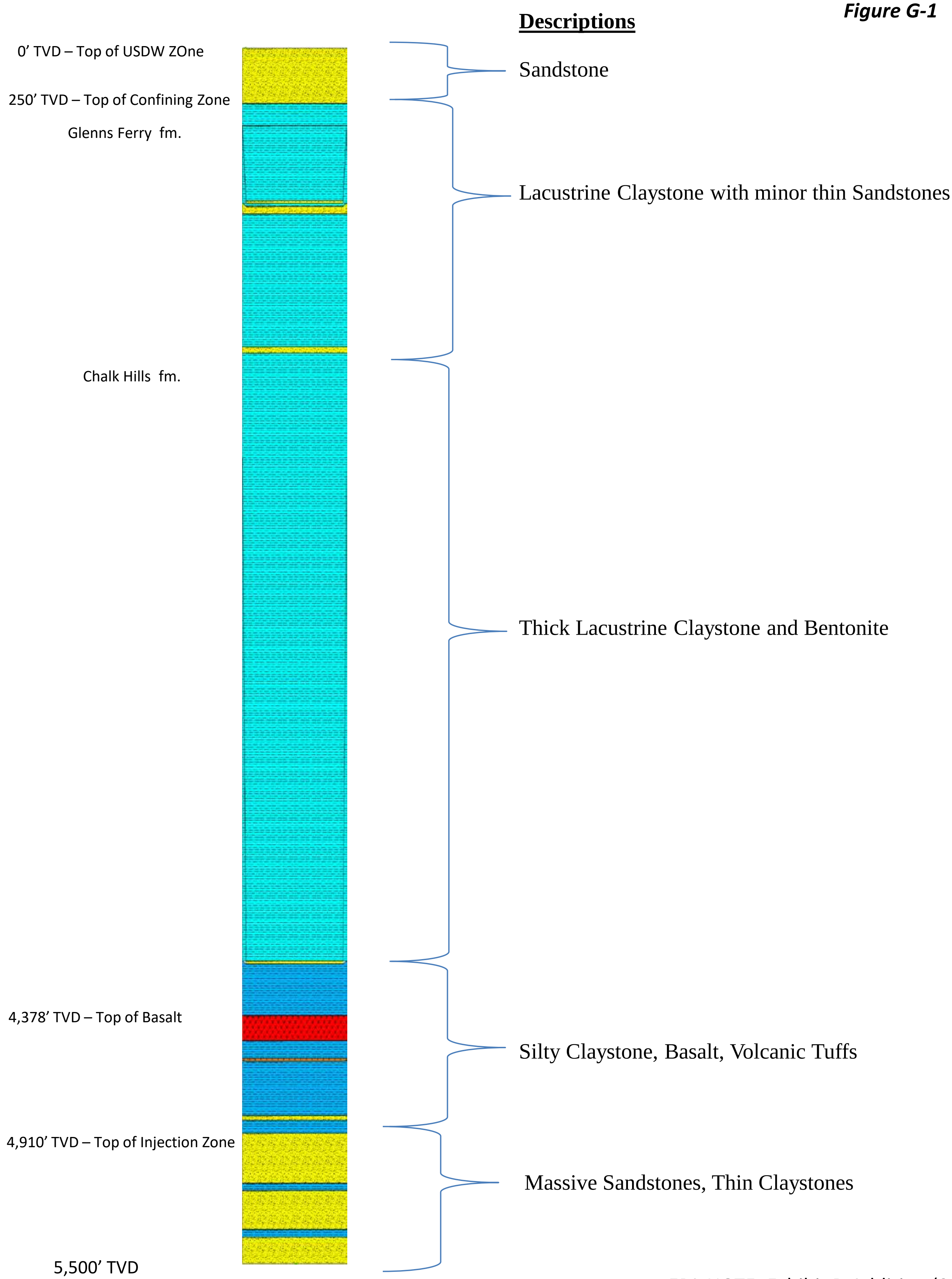
[ii] *Oil and water can mix: Moving toward water stewardship in the oil and gas industry*, Deloitte Center for Energy Solutions, Houston, 2014.

[iii] *EWG Tap Water Database*, January – March 2017, results of tests conducted by the water utility and provided to the Environmental Working Group by the Idaho Department of Environmental Quality, as well as information from the U.S. EPA Enforcement and Compliance History database (ECHO). This utility is shown as being in violation of federal drinking water standards for 12-quarters, April 2014 – Mar. 2017.

[iv] *Financial Perceptions on Oil Spill Disasters: Isolating Corporate Reputational Risk*, José M. Feria-Domínguez, Enrique Jiménez-Rodríguez and Inés Merino Fdez-Galiano, Sustainability Journal, 2016, 8, 1090; doi:10.3390/su8111090, MDPI.com

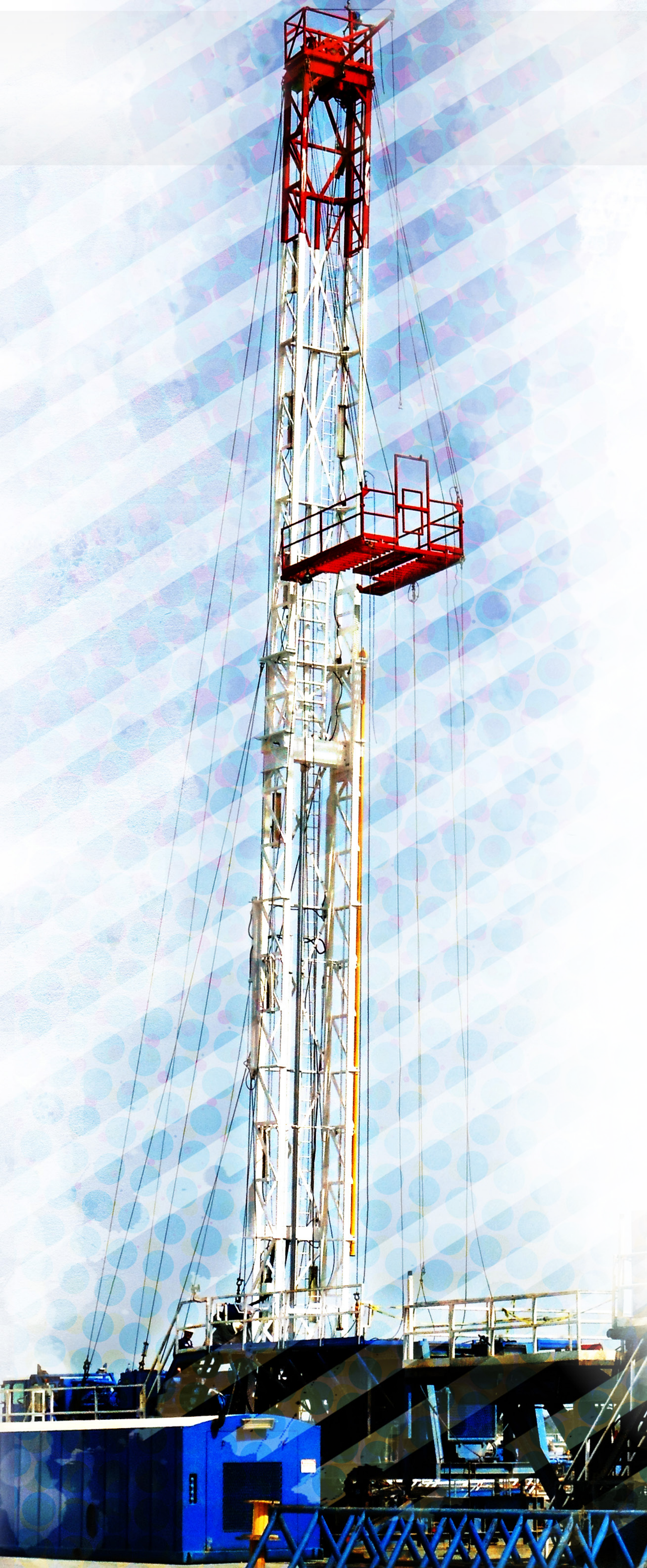
DJS 2-14 Composite Lithological Section

Figure G-1



EPA NOTE: Exhibit D Addition (9/11/2018)

EPA NOTE: Exhibit E Addition (9/11/2018)



RIG 7

RIG

Our Rig 7 is a self-propelled, hydraulically raised and scoped double with a depth rating of 8,500’. This Rig is a very fast mover and has an extremely small and flexible footprint.

DRAWWORKS

Cooper LTO-550 double drum hoist powered by one Detroit Diesel Series 60, electronically controlled engine with Allison 6-speed Automatic Transmission.

DERRICK

SKM 104’, 260,000 lb. telescoping derrick.

SUBBASE

PGDS Self Contained, Box Type Sub Base. The floor measures 20’ X 16’ X 13’ high. This unit includes a 50’ racking platform and houses the rotary drive system.

ROTARY DRIVE SYSTEM

National 17 1/2” rotary table powered by Detroit Diesel Series 50 electronically controlled diesel engine with Allison HT-740 automatic transmission.

TRAVELING EQUIPMENT

- McKissick model FIG-663, 150 ton traveling block hook combination with four 1” sheaves.
- Oilwell PC-150 swivel.
- 4 1/4” x 41’ square kelly.
- Baash Ross 1RHS4 square drive kelly bushings

HANDLING EQUIPMENT

PGDS HydraCat system for makeup and breakout. Air spinning chain. Pullmaster M8, 8000 lb. hydraulic winch for the main line. Pullmaster M8, 8000 lb. hydraulic winch for the high line.

MUD PUMPS

Pumps 1 and 2 are identical. They are Mud King MZ-9 triplex pump powered by (1) MTU 12V-2000, electronically controlled engines. Pump is complete with a 20 gallon pulsation dampener and 5 x 6 charging pumps. All piping and valves are 4” 5000 lb. test pressure. Pumps come standard with 6” liners. Other liner sizes are available upon request.

MUD SYSTEM

Two tank in line configuration with an active capacity of 320 bbls. Equipped with (2) PGDS model 357 linear shale shakers, Halco 6” High Shear mud hopper, (2) electric driven 5 x 6 centrifugal pumps powered by Toshiba 40 hp electric motors, (4) 5 hp mechanical agitators, mud dock, and pill pit.

GENERATORS

(2) 280 KW Stewart & Stevenson Generators powered by Series 60 electronically tcontrolled engines mounted in an enclosed 40’ x 8’ x 8’ high house with Square “D” switchgear and Dresser Air Compressors.

STORAGE TANK:

Water tank is 40 ft. by 8 ft. wide and 8 ft. high with a 450-barrel capacity. Water is supplied by (2) 1 ½” x 2” centrifugal pumps. Integrally mounted is a 650 gallon closed circuit cooling system with (2) 1 ½” x 2” centrifugal pumps for brake water filtering and cooling

Fuel storage tank is 5000 gallon capacity with an environmentally safe lube rack including four 105 gal oil tanks, one 225 gal waste oil tank, and one spill prevention materials cabinet.

Secondary and tertiary containment is available upon request.

HOUSES

Doghouse is 40’ x 8’ x 8’ high with lockers, drinking water, first aid station, Tool Pusher Office and Parts Room.

MISCELLANEOUS:

Five Star electric over hydraulic survey unit with 22000 feet of .092” slick line.

EPA NOTE: Exhibit F Addition (9/11/2018)

Analytical Laboratories, Inc.

1804 N. 33rd Street
Boise, Idaho 83703
Phone (208) 342-5515

Attn: JEFF JANIK
ALTA MESA SERVICES, LP
15021 KATY FREEWAY STE 400
HOUSTON, TX 77094

Collected By: J JANIK
Submitted By: J JANIK

Perfs 5380 - 5390'

Source of Sample:
DJS PROP 2-14 PRODUCOD WATER

Time of Collection: 16:00
Date of Collection: 10/22/2014
Date Received: 10/23/2014
Report Date: 11/7/2014

Field Temp:
Temp Rcvd in Lab: 20.4 °C
PWS:
PWS Name

Laboratory Analysis Report

Sample Number: 1442245

NO FIELD TEMP GIVEN; NO TRAVEL BLANKS RCVD; Methane, Ethane, and Ethene testing were performed by Accutest Mountain States (AMS).

Test Requested	MCL	Analysis Result	Units	MDL	Method	Date Completed	Analyst
Aluminum, Al	UR	1.12	mg/L	0.10	EPA 200.7	10/24/2014	KC
Arsenic Low	0.01	< 0.005	mg/L	0.005	EPA 200.8	11/3/2014	JH
Barium, Ba	2	0.12	mg/L	0.05	EPA 200.7	10/24/2014	KC
Boron, B		7.40	mg/L	0.10	EPA 200.7	11/4/2014	KC
Calcium, Ca	UR	51.1	mg/L	0.50	EPA 200.7	10/28/2014	KC
Iron, Fe	UR	11.9	mg/L	0	EPA 200.7	10/29/2014	KC
Magnesium, Mg	UR	0.50	mg/L	0.50	EPA 200.7	10/28/2014	KC
Manganese Low		0.128	mg/L	0.005	EPA 200.7	10/24/2014	KC
Potassium, K	UR	56.7	mg/L	0.5	EPA 200.7	10/28/2014	KC
Selenium Low	0.05	< 0.005	mg/L	0.005	EPA 200.8	11/3/2014	JH
Silica	UR	106	mg/L	0.25	EPA 200.7	11/4/2014	KC
Sodium, Na	UR	392	mg/L	0.50	EPA 200.7	10/28/2014	KC
Uranium, U	30	< 5	ug/L	5	EPA 200.8	11/3/2014	JH
Metals Digestion		*			EPA 200.9-11	10/23/2014	JMS
Density		0.998	g/mL		Gravimetric	11/4/2014	JH
Nitrate (as N)		< 0.2	mg/L	0.2	EPA 300.0	10/23/2014	NC

MCL = Maximum Contamination Level
MDL = Method/Minimum Detection Limit
UR = Unregulated

Date Report Printed: 11/7/2014 11:59:12

Laboratory Analysis Report

Sample Number: 1442245

NO FIELD TEMP GIVEN; NO TRAVEL BLANKS RCVD; Methane, Ethane, and Ethene testing were performed by Accutest Mountain States (AMS).

Test Requested	MCL	Analysis Result	Units	MDL	Method	Date Completed	Analyst
Benzene		1510	ug/L	0.5	EPA 8260B	10/28/2014	CY
Toluene		830	ug/L	0.5	EPA 8260B	10/28/2014	CY
Ethylbenzene		55.0	ug/L	0.5	EPA 8260B	10/28/2014	CY
Xylene, Total		390	ug/L	0.5	EPA 8260B	10/28/2014	CY
Methane		2.49	mg/L	0.0008	RSKSOP 175	10/27/2014	AMS
Ethane		0.399	mg/L	0.0016	RSKSOP 175	10/27/2014	AMS
Ethene		<0.0024	mg/L	0.0024	RSKSOP 175	10/27/2014	AMS
Alkalinity	UR	332	mg/L CaCO3		EPA 310.1	10/30/2014	CJS
Chloride, Cl	UR	305	mg/L	1	EPA 300.0	10/23/2014	NC
Fluoride, F	4.0	6.88	mg/L	0.10	EPA 300.0	10/23/2014	NC
Sulfate, SO4	UR	34	mg/L	1	EPA 300.0	10/23/2014	NC
pH	UR	8.8	S.U.		SM 4500-H B	10/23/2014	RME
Conductivity	UR	1,880	umhos	2	SM 2510B	10/23/2014	RME
Bicarbonate		302	mg/L		SM 2320	10/30/2014	CJS
Carbonate		29.8	mg/L		SM 2320	10/30/2014	CJS
Hydroxide		0.0	mg/L		SM 2320	10/30/2014	CJS
Resistivity		5.32	ohm*cm			10/23/2014	DS
Total Dissolved Solids	UR	1,540	mg/L	25	SM 2540C	10/28/2014	GM

MCL = Maximum Contamination Level
MDL = Method/Minimum Detection Limit
UR = Unregulated

Thank you for choosing Analytical Laboratories for your testing needs.
If you have any questions concerning this report,
please contact your client manager: **James Hibbs**

Date Report Printed: 11/7/2014 11:59:12

Analytical Laboratories, Inc.

1804 N. 33rd Street
Boise, Idaho 83703
Phone (208) 342-5515

Date Report Printed: 11/21/2014 3:49:55 PM
http://www.analyticallaboratories.com
These test results relate only to the items tested.

Laboratory Analysis Report

Sample Number: 1442246

Attn: JEFF JANIK
ALTA MESA SERVICES, LP
15021 KATY FREEWAY STE 400
HOUSTON, TX 77094

Collected By: J JANIK
Submitted By: J JANIK

Source of Sample:
DJS PROP 2-14 PRODUCOD WATER

Time of Collection: 16:00
Date of Collection: 10/22/2014
Date Received: 10/23/2014
Report Date: 11/21/2014

PWS#:

Field Temp: Temp Rcvd in Lab: 20.4 °C

PWS Name:

NO FIELD TEMP GIVEN; Radiological testing was performed by Summit Environmental (SUM).

Test Requested	MCL	Analysis Result	Units	MDL	Method	Date Completed	Analyst
Gross Alpha	15 pCi	<3	pCi/L	3	EPA 900.0	11/11/2014	SUM
Gross Beta		57+/-5.8	pCi/L	4	EPA 900.0	11/11/2014	SUM

Thank you for choosing Analytical Laboratories for your testing needs.

If you have any questions about this report, or any future analytical needs, please contact your client manager:
James Hibbs

MCL = Maximum Contamination Level
MDL = Method/Minimum Detection Limit
UR = Unregulated

CLIENT CODE=

CHAIN OF CUSTODY RECORD

CLIENT INFORMATION:		PROJECT INFORMATION:
Project Manager: JEFF JANIK		Project Name: DJS PROP. 2-14
Company: ALTA MESA SERVICES		PWS Number:
Address: 15021 KATY FRWY, SUITE 400 HOUSTON, TX 77094		Purchase Order Number:
		Required Due Date:
Phone: 713.824.9427	Fax:	E-mail Address: JJANIK@ALTAMESA.NET
Sampled by: (Please print) JEFF JANIK		Transported by: (Please print) JEFF JANIK

ANALYTICAL LABS, INC.
1804 N. 33rd Street • Boise, ID 83703
(208) 342-5515 • Fax: (208) 342-5591 • 1-800-574-5773
Website: www.analyticallaboratories.com
E-mail: ali@analyticallaboratories.com

TESTS REQUESTED

FOLLOW BOTTLES

Lab ID	Date Sampled	Time Sampled	Sample Description (Source)	Sample Matrix									Remarks:
42245	8/22	4:00	PRODUCED WATER										
	8/22	4:00	"										
	8/22	4:00	"										
	8/22	4:00	"										
	8/22	4:00	"										
	8/22	4:00	"										
42246	8/22	4:00	"										CADS/Alpha/Beta
	10/22		"										
	RB		"										
			"										

Invoice to: (If different than above address)

Special Instructions: * NO field Temp rec/ NO Travel Blanks rec

ALLOCATIONS OF RISK: Analytical Laboratories, Inc. will perform preparation and testing services, obtain findings and prepare reports in accordance with Good Laboratory Practices (GLP). If, for any reason, Analytical Laboratories, Inc. errors in the conduct of a test or procedure, their liability shall be limited to the cost of the test or procedure completed in error. Under no circumstances will Analytical Laboratories, Inc. be liable for any other cost associated with obtaining a sample or use of data.

Note: Samples are discarded 21 days after results are reported. Hazardous samples will be returned to client or disposed of at client expense.

	Print Name:	Company:	Date:	Time:
Relinquished By: (Signature) [signature]	JEFF JANIK	ALTA MESA SERVICES	8/23/14	9:35 AM
Received By: (Signature)				
Relinquished By: (Signature)			10/23/14	
Received By: (Signature) Jordyn Salyers	Jordyn Salyers	ALI	~~8/23/14~~	9:35 a.m

SAMPLE RECEIPT	Total # of Containers: 10	Chains of Custody Seals Y / N / NA	Intact: Y / N / NA	Temperature Received: 20.4°C	Condition: *

REV. 2/19/12 WHITE: STAYS WITH SAMPLE (S) YELLOW: LAB PINK: SAMPLER

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: ALTA MESA INC
Address: 15021 KATY FWY, SUITE 400
HOUSTON, TEXAS 77094
Attn: WADE MOORE

Batch #: 160525003
Project Name: ALTA MESA TANK

Analytical Results Report

Sample Number 160525003-001 **Sampling Date** 5/23/2016 **Date/Time Received** 5/25/2016 12:10 PM
Client Sample ID ALTA MESA TANK BATTERY **Sampling Time**
Matrix Water **Sample Location**
Comments

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Alkalinity	419	mg CaCO3/L	5	5/26/2016	KMC	SM2320B	
Aluminum	ND	mg/L	0.1	6/1/2016	HSW	EPA 200.7	
Arsenic	ND	mg/L	0.01	5/31/2016	HSW	EPA 200.8	
Barium	0.144	mg/L	0.01	5/31/2016	HSW	EPA 200.8	
Boron	6.93	mg/L	1	6/10/2016	HSW	EPA 200.8	
Cadmium	ND	mg/L	0.01	5/31/2016	HSW	EPA 200.8	
Calcium	16.1	mg/L	1	6/1/2016	HSW	EPA 200.7	
Chloride	143	mg/L	1	5/25/2016 4:25:00 PM	MER	EPA 300.0	
Chromium	ND	mg/L	0.1	6/10/2016	HSW	EPA 200.8	
Conductivity	1700	µmhos/cm	10	5/26/2016	KMC	SM2510B	
Copper	ND	mg/L	0.01	5/31/2016	HSW	EPA 200.8	
Cyanide (free)	0.0197	mg/L	0.01	6/6/2016	MER	SM4500CNE	
Fluoride	7.77	mg/L	1	5/25/2016 4:25:00 PM	MER	EPA 300.0	
Gross Alpha	0.013 +/- 1.62	pCi/L	2.43	6/13/2016	JWC	EPA 900.0	
Gross Beta	20.4 +/- 4.00	pCi/L	3.05	6/13/2016	JWC	EPA 900.0	
Iron	2.33	mg/L	0.2	6/1/2016	HSW	EPA 200.7	
Lead	ND	mg/L	0.01	5/31/2016	HSW	EPA 200.8	
Magnesium	ND	mg/L	1	6/1/2016	HSW	EPA 200.7	
Manganese	ND	mg/L	0.1	6/1/2016	HSW	EPA 200.7	
Mercury-CVAFS	0.476	ug/L	0.01	5/31/2016	ETL	EPA 245.7	
NO3/N	ND	mg/L	1	5/25/2016 4:25:00 PM	MER	EPA 300.0	
NO2/N	ND	mg/L	1	5/25/2016 4:25:00 PM	MER	EPA 300.0	
Potassium	40.8	mg/L	1	6/1/2016	HSW	EPA 200.7	
Radium 226	0.05 +/- 0.10	pCi/L	0.12	6/9/2016	JMI	EPA 903.0	
Radium 228	-0.136 +/- 0.555	pCi/L	0.260	6/10/2016	JMI	EPA 904.0	
Selenium	ND	mg/L	0.01	5/31/2016	HSW	EPA 200.8	
Methanol	667	mg/L	25	6/1/2016	TGT	GC/FID	
Silica (as SiO2)	77.5	mg/L	1	6/1/2016	HSW	EPA 200.7	
Silicon	36.2	mg/L	1	6/1/2016	HSW	EPA 200.7	
Silver	ND	mg/L	0.01	5/31/2016	HSW	EPA 200.8	
Sodium	314	mg/L	1	6/1/2016	HSW	EPA 200.7	
TDS	1420	mg/L	50	5/25/2016	KMC	SM 2540C	
TSS	15.7	mg/L	1	5/26/2016	KMC	SM 2540D	
Strontium	0.508	mg/L	0.1	5/31/2016	HSW	EPA 200.8	

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504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: ALTA MESA INC
Address: 15021 KATY FWY, SUITE 400
HOUSTON, TEXAS 77094
Attn: WADE MOORE

Batch #: 160525003
Project Name: ALTA MESA TANK

Analytical Results Report

Sample Number 160525003-001 **Sampling Date** 5/23/2016 **Date/Time Received** 5/25/2016 12:10 PM
Client Sample ID ALTA MESA TANK BATTERY **Sampling Time**
Matrix Water **Sample Location**
Comments

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Sulfate	9.58	mg/L	1	5/25/2016 4:25:00 PM	MER	EPA 300.0	
MBAS	0.166	mg/L 342.4MW LAS	0.1	6/2/2016	KMC	SM5540C	
Thallium	ND	mg/L	0.01	5/31/2016	HSW	EPA 200.8	
Turbidity	48.5	NTU	0.1	5/26/2016	KMC	EPA 180.1	
Uranium	ND	mg/L	0.01	5/31/2016	HSW	EPA 200.8	
Uranium Activity	ND	pCi/L	6.7	5/31/2016	HSW	EPA 200.8	

Authorized Signature

John Coddington, Lab Manager

MCL EPA's Maximum Contaminant Level
ND Not Detected
PQL Practical Quantitation Limit

The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013;NV:ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

Anatek Labs, Inc.

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504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client:	ALTA MESA INC	**Batch #:**	160525003
Address:	15021 KATY FWY, SUITE 400 HOUSTON, TEXAS 77094	**Project Name:**	ALTA MESA TANK
Attn:	WADE MOORE		

Analytical Results Report

Sample Number	160525003-001	**Sampling Date**	5/23/2016	**Date/Time Received**	5/25/2016	12:10 PM
Client Sample ID	ALTA MESA TANK BATTERY	**Sampling Time**		**Extraction Date**	5/26/2016	
Matrix	Water	**Sample Location**				
Comments						

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Diesel	32.3	mg/L	0.1	5/31/2016	TGT	EPA 8015D	
Lube Oil	7.48	mg/L	0.5	5/31/2016	TGT	EPA 8015D	
Gasoline	38.4	mg/L	0.1	6/1/2016	SAT	EPA 8015D	

Surrogate Data

Sample Number 160525003-001

Surrogate Standard	Method	Percent Recovery	Control Limits
4-Bromofluorobenzene	EPA 8015D	111.2	50-150
Hexacosane	EPA 8015D	84.2	50-150

Authorized Signature

John Coddington, Lab Manager

MCL	EPA's Maximum Contaminant Level
ND	Not Detected
PQL	Practical Quantitation Limit

This report shall not be reproduced except in full, without the written approval of the laboratory.
The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013;NV:ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

Anatek Labs, Inc.

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504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: ALTA MESA INC
Address: 15021 KATY FWY, SUITE 400
HOUSTON, TEXAS 77094
Attn: WADE MOORE

Batch #: 160525003
Project Name: ALTA MESA TANK

Analytical Results Report

Sample Number 160525003-001
Client Sample ID ALTA MESA TANK BATTERY
Matrix Water
Comments

Sampling Date 5/23/2016
Sampling Time
Sample Location

Date/Time Received 5/25/2016 12:10 PM

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
1,1,1,2-Tetrachloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,1,1-Trichloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,1,2,2-Tetrachloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,1,2-Trichloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,1-Dichloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,1-Dichloroethene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,1-dichloropropene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2,3-Trichlorobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2,3-Trichloropropane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2,4-Trichlorobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2,4-Trimethylbenzene	257	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2-Dibromo-3-chloropropane(DBCP)	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2-Dibromoethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2-Dichlorobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2-Dichloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2-Dichloropropane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,3,5-Trimethylbenzene	127	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,3-Dichlorobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,3-Dichloropropane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,4-Dichlorobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
2,2-Dichloropropane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
2-Chlorotoluene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
2-hexanone	ND	ug/L	2.5	6/1/2016	SAT	EPA 8260C	
4-Chlorotoluene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Acetone	13500	ug/L	2.5	6/1/2016	SAT	EPA 8260C	
Acrylonitrile	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Benzene	24800	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Bromobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013;NV:ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

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Client: ALTA MESA INC
Address: 15021 KATY FWY, SUITE 400
HOUSTON, TEXAS 77094
Attn: WADE MOORE

Batch #: 160525003
Project Name: ALTA MESA TANK

Analytical Results Report

Sample Number 160525003-001
Client Sample ID ALTA MESA TANK BATTERY
Matrix Water
Comments

Sampling Date 5/23/2016
Sampling Time
Sample Location

Date/Time Received 5/25/2016 12:10 PM

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Bromochloromethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Bromodichloromethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Bromoform	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Bromomethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Carbon disulfide	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Carbon Tetrachloride	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Chlorobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Chloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Chloroform	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Chloromethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
cis-1,2-dichloroethene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
cis-1,3-Dichloropropene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Dibromochloromethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Dibromomethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Dichlorodifluoromethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Ethylbenzene	1080	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Hexachlorobutadiene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Isopropylbenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
m+p-Xylene	4170	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Methyl ethyl ketone (MEK)	ND	ug/L	2.5	6/1/2016	SAT	EPA 8260C	
Methyl isobutyl ketone (MIBK)	ND	ug/L	2.5	6/1/2016	SAT	EPA 8260C	
Methylene chloride	ND	ug/L	2.5	6/1/2016	SAT	EPA 8260C	
methyl-t-butyl ether (MTBE)	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Naphthalene	59.2	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
n-Butylbenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
n-Propylbenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
o-Xylene	1150	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
p-isopropyltoluene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
sec-Butylbenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013;NV:ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

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Client: ALTA MESA INC
Address: 15021 KATY FWY, SUITE 400
HOUSTON, TEXAS 77094
Attn: WADE MOORE

Batch #: 160525003
Project Name: ALTA MESA TANK

Analytical Results Report

Sample Number 160525003-001
Client Sample ID ALTA MESA TANK BATTERY
Matrix Water
Comments

Sampling Date 5/23/2016
Sampling Time
Sample Location

Date/Time Received 5/25/2016 12:10 PM

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Styrene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
tert-Butylbenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Tetrachloroethene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Toluene	17800	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
trans-1,2-Dichloroethene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
trans-1,3-Dichloropropene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Trichloroethene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Trichloroflouromethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Vinyl Chloride	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	

Surrogate Data

Sample Number 160525003-001

Surrogate Standard	Method	Percent Recovery	Control Limits
1,2-Dichlorobenzene-d4	EPA 8260C	101.6	70-130
4-Bromofluorobenzene	EPA 8260C	99.6	70-130
Toluene-d8	EPA 8260C	99.6	70-130

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Client:	ALTA MESA INC	**Batch #:**	160525003
Address:	15021 KATY FWY, SUITE 400	**Project Name:**	ALTA MESA TANK
	HOUSTON, TEXAS 77094		
Attn:	WADE MOORE		

Analytical Results Report

Sample Number	160525003-002	**Sampling Date**	5/23/2016	**Date/Time Received**	5/25/2016 12:10 PM
Client Sample ID	TRIP BLANK	**Sampling Time**			
Matrix	Water	**Sample Location**			
Comments					

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
1,1,1,2-Tetrachloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,1,1-Trichloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,1,2,2-Tetrachloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,1,2-Trichloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,1-Dichloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,1-Dichloroethene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,1-dichloropropene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2,3-Trichlorobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2,3-Trichloropropane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2,4-Trichlorobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2,4-Trimethylbenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2-Dibromo-3-chloropropane(DBCP)	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2-Dibromoethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2-Dichlorobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2-Dichloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2-Dichloropropane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,3,5-Trimethylbenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,3-Dichlorobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,3-Dichloropropane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,4-Dichlorobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
2,2-Dichloropropane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
2-Chlorotoluene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
2-hexanone	ND	ug/L	2.5	6/1/2016	SAT	EPA 8260C	
4-Chlorotoluene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Acetone	ND	ug/L	2.5	6/1/2016	SAT	EPA 8260C	
Acrylonitrile	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Benzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Bromobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Bromochloromethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	

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Client: ALTA MESA INC
Address: 15021 KATY FWY, SUITE 400
HOUSTON, TEXAS 77094
Attn: WADE MOORE

Batch #: 160525003
Project Name: ALTA MESA TANK

Analytical Results Report

Sample Number 160525003-002
Client Sample ID TRIP BLANK
Matrix Water
Comments

Sampling Date 5/23/2016
Sampling Time
Sample Location

Date/Time Received 5/25/2016 12:10 PM

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Bromodichloromethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Bromoform	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Bromomethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Carbon disulfide	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Carbon Tetrachloride	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Chlorobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Chloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Chloroform	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Chloromethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
cis-1,2-dichloroethene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
cis-1,3-Dichloropropene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Dibromochloromethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Dibromomethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Dichlorodifluoromethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Ethylbenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Hexachlorobutadiene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Isopropylbenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
m+p-Xylene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Methyl ethyl ketone (MEK)	ND	ug/L	2.5	6/1/2016	SAT	EPA 8260C	
Methyl isobutyl ketone (MIBK)	ND	ug/L	2.5	6/1/2016	SAT	EPA 8260C	
Methylene chloride	ND	ug/L	2.5	6/1/2016	SAT	EPA 8260C	
methyl-t-butyl ether (MTBE)	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Naphthalene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
n-Butylbenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
n-Propylbenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
o-Xylene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
p-isopropyltoluene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
sec-Butylbenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Styrene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013;NV:ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

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Client:	ALTA MESA INC	**Batch #:**	160525003
Address:	15021 KATY FWY, SUITE 400 HOUSTON, TEXAS 77094	**Project Name:**	ALTA MESA TANK
Attn:	WADE MOORE		

Analytical Results Report

Sample Number	160525003-002	**Sampling Date**	5/23/2016	**Date/Time Received**	5/25/2016	12:10 PM
Client Sample ID	TRIP BLANK	**Sampling Time**				
Matrix	Water	**Sample Location**				
Comments						

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
tert-Butylbenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Tetrachloroethene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Toluene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
trans-1,2-Dichloroethene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
trans-1,3-Dichloropropene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Trichloroethene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Trichloroflouromethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Vinyl Chloride	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	

Surrogate Data

Sample Number 160525003-002

Surrogate Standard	Method	Percent Recovery	Control Limits
1,2-Dichlorobenzene-d4	EPA 8260C	102.0	70-130
4-Bromofluorobenzene	EPA 8260C	99.2	70-130
Toluene-d8	EPA 8260C	100.8	70-130

Authorized Signature

John Coddington, Lab Manager

MCL EPA's Maximum Contaminant Level
ND Not Detected
PQL Practical Quantitation Limit

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Client: ALTA MESA INC
Address: 15021 KATY FWY, SUITE 400
HOUSTON, TEXAS 77094
Attn: WADE MOORE

Batch #: 160525003
Project Name: ALTA MESA TANK

Analytical Results Report

Sample Number 160525003-001
Client Sample ID ALTA MESA TANK BATTERY
Matrix Water
Comments

Sampling Date 5/23/2016
Sampling Time
Sample Location

Date/Time Received 5/25/2016 12:10 PM
Extraction Date 5/30/2016

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
1,2,4-Trichlorobenzene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
1,2-Dichlorobenzene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
1,2-Diphenyl hydrazine	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
1,3-Dichlorobenzene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
1,4-Dichlorobenzene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
1-Methylnaphthalene	116	ug/L	10	6/7/2016	HSW	EPA 8270D	
2,3,4,6-Tetrachlorophenol	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
2,3,5,6-Tetrachlorophenol	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
2,4,5-Trichlorophenol	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
2,4,6-Trichlorophenol	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
2,4-Dichlorophenol	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
2,4-Dimethylphenol	571	ug/L	100	6/7/2016	HSW	EPA 8270D	
2,4-Dinitrophenol	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
2,4-Dinitrotoluene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
2,6-Dinitrotoluene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
2-Chloronaphthalene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
2-Chlorophenol	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
2-Methylnaphthalene	245	ug/L	10	6/7/2016	HSW	EPA 8270D	
2-Methylphenol	1330	ug/L	100	6/7/2016	HSW	EPA 8270D	
2-Nitroaniline	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
2-Nitrophenol	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
3,3'-Dichlorobenzidine	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
3+4-Methylphenol	1880	ug/L	100	6/7/2016	HSW	EPA 8270D	
3-Nitroaniline	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
4,6-Dinitro-2-methylphenol	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
4-Bromophenyl-phenylether	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
4-Chloro-3-methylphenol	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
4-Chloroaniline	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
4-Chlorophenyl-phenylether	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
4-Nitroaniline	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
4-Nitrophenol	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Acenaphthene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Acenaphthylene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Aniline	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	

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Client:	ALTA MESA INC	**Batch #:**	160525003
Address:	15021 KATY FWY, SUITE 400	**Project Name:**	ALTA MESA TANK
	HOUSTON, TEXAS 77094		
Attn:	WADE MOORE		

Analytical Results Report

Sample Number	160525003-001	**Sampling Date**	5/23/2016	**Date/Time Received**	5/25/2016 12:10 PM
Client Sample ID	ALTA MESA TANK BATTERY	**Sampling Time**		**Extraction Date**	5/30/2016
Matrix	Water	**Sample Location**			
Comments					

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Anthracene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Benzidine	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Benzo(ghi)perylene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Benzo[a]anthracene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Benzo[a]pyrene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Benzo[b]fluoranthene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Benzo[k]fluoranthene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Benzyl alcohol	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
bis(2-Chloroethoxy)methane	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
bis(2-Chloroethyl)ether	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
bis(2-chloroisopropyl)ether	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
bis(2-Ethylhexyl)phthalate	22.3	ug/L	10	6/7/2016	HSW	EPA 8270D	
Butylbenzylphthalate	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Carbazole	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Chrysene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Dibenz[a,h]anthracene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Dibenzofuran	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Diethylphthalate	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Dimethylphthalate	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Di-n-butylphthalate	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Di-n-octylphthalate	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Fluoranthene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Fluorene	16.7	ug/L	10	6/7/2016	HSW	EPA 8270D	
Hexachlorobenzene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Hexachlorobutadiene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Hexachlorocyclopentadiene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Hexachloroethane	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Indeno[1,2,3-cd]pyrene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Isophorone	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Naphthalene	265	ug/L	10	6/7/2016	HSW	EPA 8270D	
Nitrobenzene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Nitrosodimethylamine	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
n-Nitroso-di-n-propylamine	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
n-Nitrosodiphenylamine	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Pentachlorophenol	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	

Anatek Labs, Inc.

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504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client:	ALTA MESA INC	**Batch #:**	160525003
Address:	15021 KATY FWY, SUITE 400 HOUSTON, TEXAS 77094	**Project Name:**	ALTA MESA TANK
Attn:	WADE MOORE		

Analytical Results Report

Sample Number	160525003-001	**Sampling Date**	5/23/2016	**Date/Time Received**	5/25/2016	12:10 PM
Client Sample ID	ALTA MESA TANK BATTERY	**Sampling Time**		**Extraction Date**	5/30/2016	
Matrix	Water	**Sample Location**				
Comments						

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Phenanthrene	48.5	ug/L	10	6/7/2016	HSW	EPA 8270D	
Phenol	3270	ug/L	100	6/7/2016	HSW	EPA 8270D	
Pyrene	21.3	ug/L	10	6/7/2016	HSW	EPA 8270D	
Pyridine	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	

Surrogate Data

Sample Number 160525003-001

Surrogate Standard	Method	Percent Recovery	Control Limits
2,4,6-Tribromophenol	EPA 8270D	104.2	43-120
2-Fluorobiphenyl	EPA 8270D	87.2	58-122
2-Fluorophenol	EPA 8270D	93.4	45-119
Nitrobenzene-d5	EPA 8270D	89.6	58-120
Phenol-d5	EPA 8270D	103.2	52-115
Terphenyl-d14	EPA 8270D	96.0	22-133

Authorized Signature

John Coddington, Lab Manager

MCL EPA's Maximum Contaminant Level
ND Not Detected
PQL Practical Quantitation Limit

The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013;NV:ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

Anatek Labs, Inc.

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Login Report

Customer Name: ALTA MESA INC
15021 KATY FWY, SUITE 400
HOUSTON TEXAS 77094

Order ID: 160525003
Order Date: 5/25/2016

Contact Name: WADE MOORE
Project Name: ALTA MESA TANK

Comment:

Sample #: 160525003-001 **Customer Sample #:** ALTA MESA TANK BATTERY

Recv'd: ☑ **Matrix:** Water **Collector:** JEREMY DAVIS **Date Collected:** 5/23/2016
Quantity: 17 **Date Received:** 5/25/2016 12:10:00 PM **Time Collected:**
Comment:

Test	Lab	Method	Due Date	Priority
ALKALINITY	M	SM2320B	5/25/2016	***Normal (~10 Days)***
ALUMINUM ICP	M	EPA 200.7	6/6/2016	***Normal (~10 Days)***
ARSENIC	M	EPA 200.8	6/6/2016	***Normal (~10 Days)***
BARIUM	M	EPA 200.8	6/6/2016	***Normal (~10 Days)***
BORON	M	EPA 200.8	6/6/2016	***Normal (~10 Days)***
BTEX 8260 MOSC	M	EPA 8260C	6/6/2016	***Normal (~10 Days)***
CADMIUM	M	EPA 200.8	6/6/2016	***Normal (~10 Days)***
CALCIUM ICP	M	EPA 200.7	6/6/2016	***Normal (~10 Days)***
CHLORIDE	M	EPA 300.0	6/6/2016	***Normal (~10 Days)***
CHROMIUM	M	EPA 200.8	6/6/2016	***Normal (~10 Days)***
CONDUCTIVITY	M	SM2510B	5/30/2016	***Normal (~10 Days)***
COPPER	M	EPA 200.8	6/6/2016	***Normal (~10 Days)***
CYANIDE FREE SM 4500 CN-E	M	SM4500CNE	6/6/2016	***Normal (~10 Days)***
FLUORIDE	M	EPA 300.0	6/6/2016	***Normal (~10 Days)***
GROSS ALPHA MOSC	M	EPA 900.0	6/6/2016	***Normal (~10 Days)***
GROSS BETA MOSC	M	EPA 900.0	6/6/2016	***Normal (~10 Days)***
IRON ICP	M	EPA 200.7	6/6/2016	***Normal (~10 Days)***
LEAD	M	EPA 200.8	6/6/2016	***Normal (~10 Days)***
MAGNESIUM ICP	M	EPA 200.7	6/6/2016	***Normal (~10 Days)***
MANGANESE ICP	M	EPA 200.7	6/6/2016	***Normal (~10 Days)***
MERCURY-CVAFS	M	EPA 245.7	6/6/2016	***Normal (~10 Days)***
NITRATE/N	M	EPA 300.0	5/25/2016	***Normal (~10 Days)***
NITRITE/N	M	EPA 300.0	5/25/2016	***Normal (~10 Days)***

Customer Name: ALTA MESA INC
15021 KATY FWY, SUITE 400
HOUSTON TEXAS 77094

Order ID: 160525003
Order Date: 5/25/2016

Contact Name: WADE MOORE

Project Name: ALTA MESA TANK

Comment:

POTASSIUM ICP	M	EPA 200.7	6/6/2016	***Normal (~10 Days)***
RADIUM 226 MOSC	M	EPA 903.0	6/6/2016	***Normal (~10 Days)***
RADIUM 228 MOSC	M	EPA 904.0	6/6/2016	***Normal (~10 Days)***
SELENIUM	M	EPA 200.8	6/6/2016	***Normal (~10 Days)***
SEMIVOLATILES MISC GC/FID	M	GC/FID	5/23/2016	***Normal (~10 Days)***
SILICON ICP	M	EPA 200.7	6/6/2016	***Normal (~10 Days)***
SILVER	M	EPA 200.8	6/6/2016	***Normal (~10 Days)***
SODIUM ICP	M	EPA 200.7	6/6/2016	***Normal (~10 Days)***
SOLIDS - TDS	M	SM 2540C	5/30/2016	***Normal (~10 Days)***
SOLIDS - TSS	M	SM 2540D	5/30/2016	***Normal (~10 Days)***
STRONTIUM	M	EPA 200.8	6/6/2016	***Normal (~10 Days)***
SULFATE	M	EPA 300.0	6/6/2016	***Normal (~10 Days)***
SURFACTANTS	M	SM5540C	5/25/2016	***Normal (~10 Days)***
SVOC 8270D MOSC	M	EPA 8270D	5/30/2016	***Normal (~10 Days)***
THALLIUM	M	EPA 200.8	6/6/2016	***Normal (~10 Days)***
TPHDX MOSC	M	EPA 8015D	6/1/2016	***Normal (~10 Days)***
TPHG MOSC	M	EPA 8015D	6/1/2016	***Normal (~10 Days)***
TURBIDITY	M	EPA 180.1	5/25/2016	***Normal (~10 Days)***
URANIUM	M	EPA 200.8	6/6/2016	***Normal (~10 Days)***
VOC 8260 MOSC	M	EPA 8260C	6/6/2016	***Normal (~10 Days)***

Sample #: 160525003-002 **Customer Sample #:** TRIP BLANK

Recv'd: ☑ **Matrix:** Water **Collector:** **Date Collected:** 5/23/2016
Quantity: 1 **Date Received:** 5/25/2016 12:10:00 PM **Time Collected:**
Comment:

Test	Lab	Method	Due Date	Priority
VOC 8260 MOSC	M	EPA 8260C	6/6/2016	***Normal (~10 Days)***

Customer Name:	ALTA MESA INC	**Order ID:**	160525003
	15021 KATY FWY, SUITE 400	**Order Date:**	5/25/2016
	HOUSTON TEXAS 77094		
Contact Name:	WADE MOORE	**Project Name:**	ALTA MESA TANK
Comment:			

SAMPLE CONDITION RECORD

Samples received in a cooler?	Yes
Samples received intact?	Yes
What is the temperature of the sample(s)? (°C)	5.7
Samples received with a COC?	Yes
Samples received within holding time?	Yes
Are all sample bottles properly preserved?	Yes
Are VOC samples free of headspace?	Yes
Is there a trip blank to accompany VOC samples?	Yes
Labels and chain agree?	Yes

160525 003 **ALTM** Last Due 6/6/2016
1st SAMP 5/23/2016 1st RCVD 5/25/2016
ALTA MESA TANK

Anatek Labs, Inc.

Chain of Custody Record

1282 Alturas Drive, Moscow ID 83843 (208) 883-2839 FAX 882-9246
504 E Sprague Ste D, Spokane WA 99202 (509) 838-3999 FAX 838-4433

Company Name: Alta Mesa Holdings	Project Manager: Wade Moore
Address: 4649 Little Willow Rd	Project Name & #:
City: Payette State: ID Zip: 83661	Email Address: wmoore@alta mesa.net
Phone: 832-248-9390	Purchase Order #:
Fax: N/A	Sampler Name & phone:

Turn Around Time & Reporting

Please refer to our normal turn around times at: http://www.anateklabs.com/services/guidelines/reporting.asp

_Normal
_Next Day*
_2nd Day*
_Other* _____

*All rush order requests must be prior approved.

_Phone
_Mail
_Fax
_Email

Provide Sample Description / **List Analyses Requested**

Lab ID	Sample Identification	Sampling Date/Time	Matrix	# of Containers	Sample Volume	VOC	TPH-Gx	Mercury	Metals	Cyanide	Methanol	Rad 228/226	Alpha Beta	Inorganics	SVOC
Preservative:						ı	ı	ı	ı	ı	ı	ı	ı	ı	ı
-01	Alta Mesa Tank	5/23/16	H_2O	3	40ml	X									
	Alta Mesa Tank	5/23/16	H_2O	2	40ml		X								
	Alta Mesa Tank	5/23/16	H_2O	2	40ml			X							
	Alta Mesa Tank	5/23/16	H_2O	1	250ml				X						
	Alta Mesa "	5/23/16	H_2O	1	250ml					X					
	Alta Mesa "	5/23/16	H_2O	1	250ml						X				
	Alta Mesa	5/23/16	H_2O	2	1L							X			
	Alta Mesa	5/23/16	H_2O	1	1L								X		
	Alta Mesa	5/23/16	H_2O	1	1L									X	
	Alta Mesa	5/23/16	H_2O	1	1L										X
	Alta Mesa	5/23/16	H_2O	1	1L	TPH-Dx			-						
	Alta Mesa	5/23/16	H_2O	1	1L	PAH									
-02	Trip Blank														

Note Special Instructions/Comments

1 trip blank
18 containers
MWBS

	Printed Name	Signature	Company	Date	Time
Relinquished by					
Received by	Nell Lokteff	Nell Loktett	Anatek	05/24	12:10
Relinquished by					
Received by					
Relinquished by					
Received by					

Inspection Checklist

Received Intact? Y N (Y circled)
Labels & Chains Agree? Y N
Containers Sealed? Y N (Y circled)
VOC Head Space? Y N

FedEx

Temperature (°C): 5.7 IR-1
Preservative: NAOH (14-1), HCL, HCL (1621)
Date & Time: 05/24/16 12:10
Inspected By: NL

18 containers

LAW OFFICES

MARCUS, CHRISTIAN, HARDEE & DAVIES, LLP

THE MARCUS LAW BUILDING

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February 1, 2018

ed.hagan@deq.idaho.gov
barry.burnell@deq.idaho.gov

Barry Burnell, Water Quality Division Administrator
Ed Hagan, Ground Water Program Manager
Idaho Department of Environmental Quality
1410 N. Hilton
Boise, ID 83706

Re: Alta Mesa Services, LP

Dear Barry and Ed:

Further to our in-person discussion in December, I am writing on behalf of Alta Mesa Services, LP ("AM") regarding the status of the proposed injection zone for AM's planned Class II injection well under DEQ's ground water rules. AM proposes to repurpose the existing DJS Properties #2-14 oil and gas well to a Class II injection well for disposal of produced water from nearby producing oil and gas wells. The proposed injection zone is at a depth of approximately 4,910' to 5,510' TVD (true vertical depth), and is a quartz rich sandstone located in the Chalk Hills Formation. The sand contains water, hydrocarbons and related constituents. It is confined by the overlying Glenn's Ferry Formation and upper members of the Chalk Hills Formation. AM has submitted an application to the U.S. Environmental Protection Agency to permit the well as a Class II injection well, and is awaiting the transfer of primacy over Class II wells under the federal Underground Injection Control program from IDWR to EPA before that application can be processed. I am sending you complete copies of the application materials for your reference under separate cover.

DEQ's jurisdiction over ground water quality remains an important subject. When we met, I raised the point that for aquifer classification under IDAPA 58.01.11.350 to be the appropriate path, the proposed injection zone must first meet the definition of an "aquifer" set forth in IDAPA 58.01.11.007.02, i.e., it must be "capable of yielding economically significant quantities of water to wells and springs." If it does not fall within that definition then logically there is no aquifer to classify. However, water in the proposed injection zone remains "ground water," as

IDAPA 58.01.11.007.16 makes clear that any water "which occurs beneath the surface of the earth in a saturated geological formation of rock or soil" is groundwater, even if it does not exist in an "aquifer." This indicates either (1) if the constituents in injected fluids are below "natural background levels" as defined in IDAPA 58.01.11.007.23, then IDAPA 58.01.11.200.03 provides no action is required; or (2) under IDAPA 58.01.11.400.05 the Department may "allow site-specific ground water quality levels" or "may allow site specific points of compliance" in "[s]ituations where the site background level varies from the groundwater quality standard" or "[o]ther situations authorized by the Department in writing," based on "consideration of effects to human health and the environment."

With this letter I am supplying information from which the Department may conclude that the proposed injection zone does not fall within the definition of an "aquifer" under Rule 007.02, because given the depth of the zone and the existing constituents in the water found there, it is not "capable of yielding economically significant quantities of water to wells and springs." This information is in three categories. First, information regarding the cost in equipment to drill to and produce water from the proposed injection zone; second, information regarding the character of the water and the cost in equipment for a facility necessary to eliminate BTEX, other hydrocarbons and other substances from the water to bring it to ground water standards; and third, information regarding the ongoing cost to operate the well and associated treatment facility. The information illustrates that the water is so expensive to reach and produce, and is of a character that it would be so expensive to treat it to enable beneficial use, that the proposed injection zone will never yield economically significant quantities of water to wells and springs. I include a comparison to the cost of available irrigation water in the area. The expenses I summarize below are detailed in the spreadsheet attached as Exhibit A, entitled "Deep Aquifer Utilization Costs," and in proposals from Global Advantech Resources, Ltd. regarding water treatment, which are attached as Exhibits B and C.

1. Cost of production.

The proposed injection zone is an approximately 590' thick sand beginning at 4,910' TVD. A composite lithological section illustration from the DJS Properties #2-14 well is attached as Exhibit D. The lithology of the overlying formations includes sandstone, lacustrine claystone, bentonite, silty claystone, basalt, and volcanic tuffs. AM has drilled eight oil and gas wells to similar depths in the area, and is currently drilling a ninth well. As a result it has extensive experience with the cost to drill in this setting. Drilling to nearly a mile deep requires a large rig with sufficient power and adequately sized pumps. For example, AM's current well, the Barlow #1-14 is drilling to a total depth of 5,800', using Paul Graham Drilling's Rig #7. A specification sheet for that rig is attached as Exhibit E. No rigs of this size are readily available in Idaho; any rig would have to be contracted and mobilized from a significant oil and gas producing state such as California, Colorado, or Wyoming. Including construction of a location (pad) on which to assemble the rig[1] and a short access road drilling cost to the proposed injection zone is estimated based on AM's recent experience at $2,300,000.[2] Equipping the well with a submersible pump sufficient to produce 1,000 barrels per day of water to the surface is estimated to cost an additional $200,000. The proposed injection zone is located in a rural area, requiring three-phase electrical service to be installed (both for operating the well pump and operating the associated treatment facility, discussed further below). Installation of 480V service on site is estimated at $1,380,000.

2. Cost of treatment facility.

An analytical report of water sampled from perforations at the 5,380'-5,390' level in the DJS Properties #2-14 well, i.e., in the proposed injection zone, is attached as Exhibit F. It reflects elevated levels of aluminum, barium, boron, calcium, potassium, silican, sodium, benzene, toluene, ethylbenzene, xylene, methane, ethane, chloride, fluoride, and sulfate, with TDS of over 1,500. Levels of BTEX compounds in particular are quite high. In short, the water in the proposed injection zone is unusable without significant treatment. It is similar to produced water from AM's producing wells. An analytical report of samples from AM's produced water tank battery at its Little Willow separation facility is attached as Exhibit G; it reflects similar characteristics, with the addition of some drilling fluid and production treatment components.

AM obtained cost information from an industry specialist in produced water treatment, Global Advantech Resources, Ltd. in the context of evaluating the economic viability of evaporative disposal of produced water. Global's proposals involved utilizing electrocoagulation, activated carbon absorption, ultrafiltration and air stripping, in order to capture the range of constituents present in produced water from AM's producing oil and gas wells. Cost estimates ranged from more than $3,000,000 to more than $4,000,000, depending on treatment rate. A copy of Global's proposal to AM reflecting a cost of over $3,000,000 for a treatment system capable of processing 30 barrels per hour, to wastewater reuse standards, is attached as Exhibit B. A copy of Global's report to AM reflecting an initial capital cost estimate of $4,071,000 for a treatment system capable of treating 60 barrels per hour to Groundwater Rule standards, not inclusive of piping and tanks, installation, controls, and other items for a permanent installation, is attached as Exhibit C. The items not included would add an additional several hundred thousand dollars to the cost.

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[1] Large drill rigs such as the Graham Rig #7, and their associated generators, pumps, tanks and other equipment are very heavy. A compacted and graveled pad normally is required in order to keep the rig from settling into the native soils.

[2] AM can make available for the Department's review the Authorizations for Expenditure ("AFEs") detailing the cost of drilling each of the nine wells.

3. Operating Cost.

The report from Global Advantech Resources indicates an operating cost for the water treatment system (not including power, labor and maintenance to operate the water well itself) of about $70,000 per month. While AM believes operational efficiencies may be achieved, it still foresees operating cost of about $70,000 per month for both the water well and treatment facility. 1,000 barrels of water per day is insignificant from an agricultural use (irrigation) perspective. One acre foot of water is equivalent to 7,758 barrels (1 barrel = 42 U.S. gallons). 1,000 barrels per day is the equivalent of 0.1289 acre feet per day. IDWR assumes 0.02 cfs per acre irrigated per day, or .03967 acre feet.[3] By way of another example, alfalfa is reported to require 20 to 46 inches per acre per year, or about 1.67 to 3.83 acre feet per irrigating season.[4] Thus, irrigating a ten-acre tract will consume about .2 acre feet per day. The approximate production from a water well, as described, to the proposed injection zone could irrigate less than 10 acres.[5]

The operating cost summarized above equates to about $84,000 per acre per year for a 10 acre tract. Assuming irrigation needs of 3 acre feet per acre per year, this means operating cost of about $3.61 *per barrel* of water – not taking into account the amortized capital cost of the well and treatment facility. Even assuming a relatively long amortization period of 15 years, the total cost per barrel would be double or more, i.e., $7 to 8 per barrel of water, or $54,000 to $62,000 per acre foot of water annually.

In contrast, irrigation water is available locally for about $100 per acre per year, with excess water available at $20 per acre foot.[6]

From another perspective, domestic water is available from the City of Payette at a rate of $0.238 per 100 gallons.[7] $7.00 per barrel equates to $16.67 per hundred gallons, or about 70 times the rate available from a utility.

---

[3] *See* https://www.idwr.idaho.gov/water-rights/water-use-information.html .

[4] *See* http://www.uidaho.edu/~/media/UIdaho-Responsive/Files/Extension/Drought/Alfalfa-Irrigation-Facts.ashx. Nationally irrigation rates were 2.07 acre feet per year in 2010. https://water.usgs.gov/edu/wuir.html .

[5] The normal irrigation season in southwest Idaho is 150 to 180 days. While the well could theoretically operate year round to produce more water, this would require construction of a storage facility, the cost of which would also be prohibitive.

[6] *See* http://www.blackcanyonirrigation.com/Rate_Information.html.

[7] *See* http://www.cityofpayette.com/index.asp?SEC=2C7B73EC-6162-4ACD-8F16-0230B1152EAE&Type=B_BASIC

4. Summary

To produce and render useable water from the proposed injection zone would involve a capital cost of several million dollars in drilling and equipping a well, and in constructing and commissioning a water treatment system capable of dealing with the BTEX and other problematic constituents of the water present in the proposed injection zone. That cost would result in a stream of water only adequate to irrigate a handful of acres. Ongoing operating costs would be hundreds of thousands of dollars a year. Meanwhile, irrigation water is available locally for about $1000 per year for the same size tract. Domestic water is available for about 1.4% of the cost producing and treating water from the proposed injection zone. No person or business would rationally choose to attempt to drill to and exploit the water in the proposed injection zone under these circumstances. Based on the above discussion, I suggest that the proposed injection zone is not, and will not in the foreseeable future be, capable of producing economically significant quantities of water to wells or springs, and consequently is not an "aquifer" as defined in IDAPA 58.01.11.007.02. You may wish to be provided additional information and support for the items discussed above, and AM would like to schedule a follow up meeting soon to discuss next steps.

Very truly yours,

MARCUS, CHRISTIAN, HARDEE & DAVIES, LLP

Michael Christian

MC:
Enclosure(s)
cc: Dale Hayes, Alta Mesa Services, LP

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September 11, 2018

Evan Osborne
Clarke Thurmon
EPA Region 10 UIC Program
1200 Sixth Ave., Suite 155, OCE-101
Seattle, WA 98101
Fax: 206-553-0151

Re: AM Idaho, LLC Class II UIC permit application

Dear Evan and Clarke,

Further to our recent discussions, I am writing to accomplish two things: (1) notify you that the applicant for a Class II UIC permit is changed from Alta Mesa Services, LP to AM Idaho LLC; and (2) to provide you with a modified set of attachments to the previously submitted permit application, and supplemental information and materials in support of the aquifer exemption request portion of the application.

The change of applicant name is a result of a restructuring of Alta Mesa's ownership. Alta Mesa Holdings, LP, the previous parent of both Alta Mesa Services, LP and AM Idaho LLC, merged its operations in Oklahoma into a public entity now named Alta Mesa Resources, Inc. All of the non-Oklahoma operations, including those in Idaho, were moved to a new holding entity, High Mesa Holdings, LP. Alta Mesa Services, LP is now a subsidiary of Alta Mesa Resources. Ownership of AM Idaho LLC was assigned to High Mesa Holdings, LP. As all of the producing wells and leases in Idaho are owned by AM Idaho LLC, it is more appropriate for it to be the applicant for a Class II injection well permit.

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With respect to the request for aquifer exemption, the original application attachments (at Attachment S) referenced laboratory analysis of water from the perforations at 5,380' to 5,390' of the proposed injection zone, but did not contain discussion of the factors related to aquifer identification and exemption set forth in 40 CFR 143 and 146. The applicant provided significant information to the Idaho Department of Environmental Quality (IDEQ) on a similar question – whether the proposed injection zone falls within the definition of an "aquifer" under Idaho groundwater quality rules. I am including that information (in the form of my February 1, 2018 letter to Barry Burnell of IDEQ, at the attachments to that letter) with this letter.

40 CFR 144.3 defines an "aquifer" as "a geological 'formation,' group of formations, or part of a formation that is capable of yielding a significant amount of water to a well or spring." As the letter to IDEQ and materials included with it demonstrate, the water in the proposed injection zone is located at such a depth as to be incapable of yielding a significant amount of water to a well or spring. Thus, I suggest that EPA may conclude that the proposed injection zone, while wet, is not an aquifer and the inquiry into whether an aquifer exemption is necessary may end.

Even if the proposed injection zone is considered an aquifer, it is eligible for an exemption determination. Under 40 CFR 146.4 an aquifer may be determined to be exempt if: (a) it does not currently serve as a source of drinking water; and (b) it cannot now and will not in the future serve as a source of drinking water because (i) it is situated at such a depth or location which makes recovery of water for drinking water purposes economically or technologically impractical; or (ii) it is so contaminated that it would be economically or technologically impractical to render that water fit for human consumption.

The water analysis previously supplied to EPA and the information included with the IDEQ letter establish that these factors are met for the proposed injection zone. The zone has never been used as a source of drinking water. The DJS Properties #2-14 well, drilled as an oil and gas well, is the only well ever to have accessed the zone. The well is remote, located more than a mile from the nearest residence and about five miles from the nearest town. As discussed in more detail in the IDEQ letter, water from the zone could not practically be used as a drinking water source in the future both because its depth (beginning at 4,910' TVD) makes reaching and producing it extremely expensive in comparison to other available water sources. In addition, the previously supplied analysis of water taken from the perforations at 5,380' to 5,390' of the proposed injection zone reflect elevated levels of aluminum, barium, boron, calcium, potassium, silicon, sodium, benzene, toluene, ethylbenzene, xylene, methane, ethane, chloride, fluoride and sulfate. The levels of BTEX compounds in particular are quite high. Treating water of this character to drinking water standards would be extremely expensive. The information and materials supplied with the IDEQ letter reflect that the initial capital cost to drill and equip a water well to the required depth, and construct a necessary water treatment facility, would be in the range of $6 to $7 million for a well and treatment plant capable of producing 1,000 bbl/day (not a significant amount for agricultural purposes). The operating costs for such a well and treatment plant are estimated to $70,000 per month. These would result in a cost per barrel of water in the range of $4, or about $9.50 per hundred gallons (and this is assuming a long amortization period of 15 years for the capital investment in the well and treatment plant). In contrast, domestic water is available from the City of Payette at a rate of $0.238 per hundred gallons.[1] In other words, the expense of producing and treating water from the proposed injection zone would be 40 times that of obtaining domestic water from an available local source. No rational person would undertake such a development.

Thank you for the opportunity to provide these additional materials in support of AM Idaho's application. Please let me know as you review the materials if there is any additional information I can provide.

Very truly yours,

MARCUS, CHRISTIAN, HARDEE & DAVIES, LLP

Michael Christian

MC:
cc AM Idaho LLC

---

[1] In addition, water users in the immediate vicinity for domestic and agricultural purposes typically drill wells to the much shallower Pierce Gulch aquifer, to depths of 50' to 250' as reflected on the Idaho Department of Water Resources' "Find a Well" mapping of its well registry information. *See* https://idwr.idaho.gov/wells/find-a-well.html

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October 4, 2018

Evan Osborne
Clarke Thurmon
EPA Region 10 UIC Program
1200 Sixth Ave., Suite 155, OCE-101
Seattle, WA 98101

Re: AM Idaho, LLC Class II UIC permit application No. ID2001-A
OCE-201

Dear Evan and Clarke,

Further to Peter Contreras' September 25, 2018 letter addressed to Dale R. Hayes, I write to provide the additional information requested in the letter. Sent with this letter are the following:

1. A revised EPA Form 7520-6 reflecting that AM Idaho LLC is the applicant owner and operator, signed by a responsible corporate office, F. David Murrell, who is the Vice President of Land for AM Idaho LLC.

2. As Attachment T to the application, a listing of all other related permits or construction approvals as required under 40 CFR 144.31(6), specifically, air program permits to construct issued by the Idaho Department of Environmental Quality for four oil and gas wells and one oil and gas gathering facility in Payette County, Idaho owned by AM Idaho LLC.

3. Resubmittal of the materials previously provided by me on September 11, 2018, including:

    a. My letter of that date;
    b. The revised Attachments A-U submitted with that letter;

c. A copy of a February 1, 2018 letter from me to Barry Burnell of the Idaho Department of Environmental Quality, discussing facts supporting aquifer exemption; and
d. Copies of the attachments referenced in the IDEQ letter.

4. A certification pursuant to 40 CFR 144.32(d), signed by F. David Murrell, Vice President of Lands of AM Idaho LLC as responsible corporate officer regarding the documents listed in items 2 and 3, above, and regarding this letter.

In addition, further to 40 CFR 31(e)(9), the name and address of the owner of all property within ¼ mile of the proposed facility is:

DJS Properties LLLP
Attn: Michael Simplot
10418 W. Emerald St., Suite 101
Boise, ID 83704

Thank you for the opportunity to provide these additional materials in support of AM Idaho's application. Please let me know as you review the materials if there is any additional information I can provide.

Very truly yours,

MARCUS, CHRISTIAN, HARDEE & DAVIES, LLP

Michael Christian

MC:
cc: AM Idaho LLC

OMB No. 2040-0042 Approval Expires 12/31/2018

EPA

United States Environmental Protection Agency

Underground Injection Control
Permit Application

(Collected under the authority of the Safe Drinking Water Act. Sections 1421, 1422, 40 CFR 144)

I. EPA ID Number		T/A	C
U			

Read Attached Instructions Before Starting

For Official Use Only

Application approved (mo day year)	Date received (mo day year)	Permit Number	Well ID	FINDS Number

II. Owner Name and Address

Owner Name		
AM Idaho LLC		
Street Address		**Phone Number**
15021 Katy Freeway, Suite 400		(281) 530-0991
City	**State**	**ZIP CODE**
Houston	TX	77094

III. Operator Name and Address

Owner Name		
AM Idaho LLC		
Street Address		**Phone Number**
15021 Katy Freeway, Suite 400		(281) 530-0991
City	**State**	**ZIP CODE**
Houston	TX	77094

IV. Commercial Facility	V. Ownership	VI. Legal Contact	VII. SIC Codes
[x] Yes	[x] Private	[x] Owner	NAICS = 211111
[ ] No	[ ] Federal	[ ] Operator	SIC = 1311
	[ ] Other		

VIII. Well Status *(Mark "x")*

[ ] A. Operating	Date Started (mo day year)	[x] B. Modification/Conversion	[ ] C. Proposed

IX. Type of Permit Requested *(Mark "x" and specify if required)*

[x] A. Individual	[ ] B. Area	Number of Existing Wells	Number of Proposed Wells	Name(s) of field(s) or project(s)
		1 (One oil/gas well to be modified)	0	Willow/Hamilton and Harmon exploration areas; DJS #2-14 well to be modified

X. Class and Type of Well *(see reverse)*

A. Class(es) (enter code(s))	B. Type(s) (enter code(s))	C. If class is "other" or type is code 'x,' explain	D. Number of wells per type (if area permit)
Class II	Type D	N/A	N/A

XI. Location of Well(s) or Approximate Center of Field or Project

Latitude			Longitude			Township and Range							
Deg	Min	Sec	Deg	Min	Sec	Sec	Twp	Range	1/4 Sec	Feet From	Line	Feet From	Line
44	02	19.2	116	46	60	14	8N	4W	NW	95	NL	2315	WL

XII. Indian Lands (Mark 'x')

[ ] Yes

[x] No

XIII. Attachments

(Complete the following questions on a separate sheet(s) and number accordingly; see instructions)

For Classes I, II, III, (and other classes) complete and submit on a separate sheet(s) Attachments A--U (pp 2-6) as appropriate. Attach maps where required. List attachments by letter which are applicable and are included with your application.

XIV. Certification

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possiblity of fine and imprisonment. (Ref. 40 CFR 144.32)

A. Name and Title *(Type or Print)*	B. Phone No. *(Area Code and No.)*
F. David Murrell, VP Land	281-530-0991
C. Signature	**D. Date Signed**
[signature]	10/4/18

EPA Form 7520-6 (Rev. 12-11)

ATTACHMENT T

Clean Air Act permits to construct were issued by the Idaho Department of Environmental Quality for the following facilities, four of which are oil and gas wells in Payette County and one of which is the associated Little Willow gathering facility:

Facility	Program	Permit No.
ML Investments #1-3 well	Air	P-2015.0051
ML Investments #2-3 well	Air	P-2015.0057
Kauffman #1-34 well	Air	P-2015.0056
Kauffman #1-9 well	Air	P-2015.0049
Little Willow Gathering Facility	Air	P-2015.0015

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September 11, 2018

Evan Osborne
Clarke Thurmon
EPA Region 10 UIC Program
1200 Sixth Ave., Suite 155, OCE-101
Seattle, WA 98101
Fax: 206-553-0151

Re: AM Idaho, LLC Class II UIC permit application

Dear Evan and Clarke,

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Michael Christian

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EPA CLASS II INJECTION WELL PERMIT

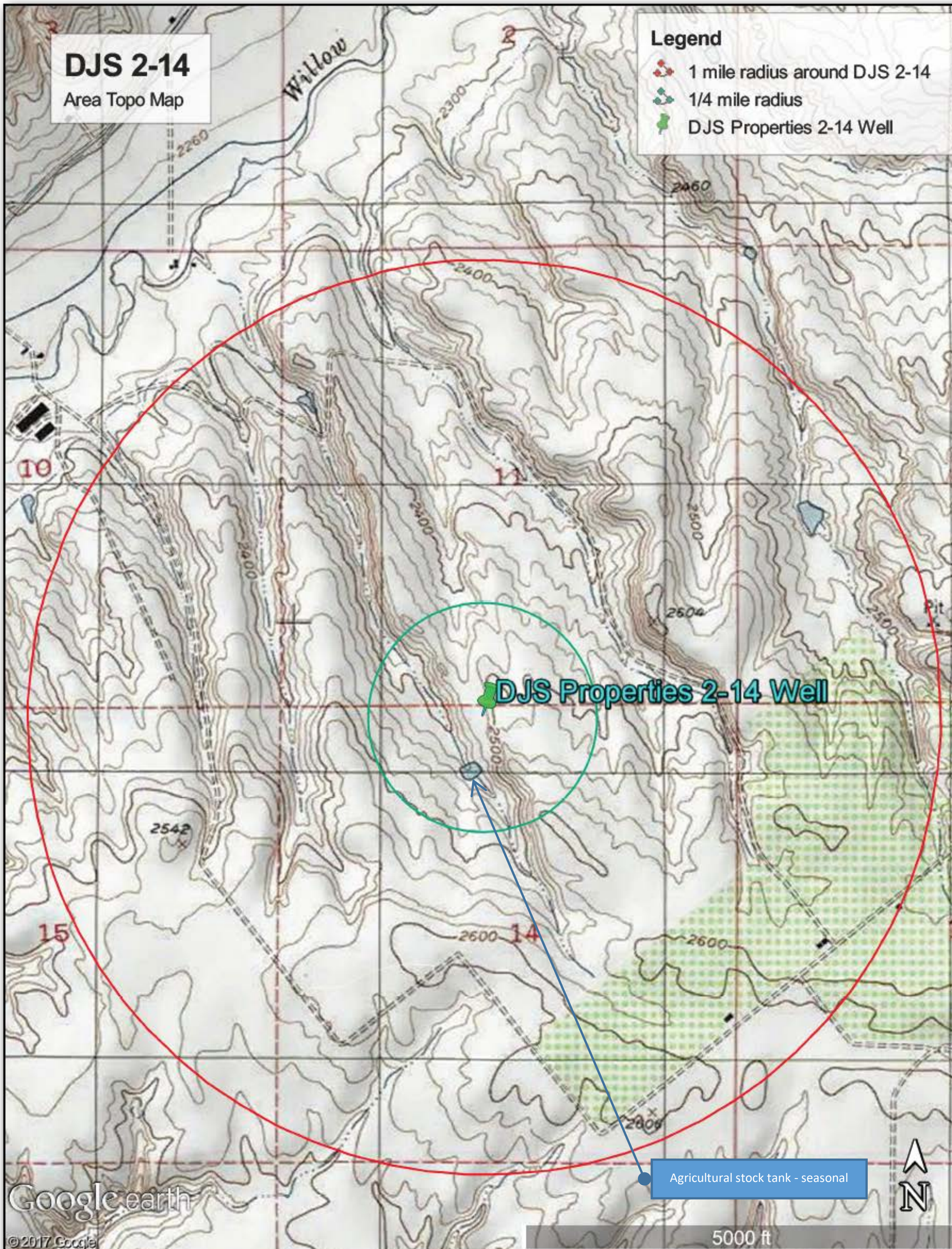
TABLE OF CONTENTS:

ATTACHMENT A

A. **AREA OF REVIEW -** 40 CFR 146.6 requires that the area of review (AOR) for each injection well or each field, project or area of the State be determined per either paragraph (a) or (b) of the regulation. Based on the remote location of the well and the lack of potential pathways which may cause the migration of the injection and/or formation fluid into an underground source of drinking water, AM Idaho LLC has adopted the ¼ mile fixed radius to define the project AOR provided for in the regulations (i.e., 40 CFR 146.6(b)). Specifically, the AOR for this application encompasses a ¼ mile radius circle from the wellbore.

ATTACHMENT B

B. **MAPS OF WELL/AREA AND AREA OF REVIEW -** There are no notable wells, springs, water bodies, etc. within the 0.25 mile radius Area of Review.



-

ATTACHMENT C

C. **CORRECTIVE ACTION PLAN AND WELL DATA -** There are no wells within the area of review.

ATTACHMENT E

E. NAME AND DEPTH OF USDWs (CLASS II) - The Pierce Gulch Aquifer (USDW) is regionally present in the area around the DJS Properties 2-14 Well. In the DJS Properties 2-14, sand is present from the surface to a depth of approximately 250' TVD.

ATTACHMENT G

G. GEOLOGICAL DATA ON INJECTION AND CONFINING ZONES (Class II) - In the DJS Properties 2-14 well the proposed injection zone is in the lower section of the Chalk Hills Formation, which is dominantly composed of massive porous and permeable quartz rich sandstones. The massive sandstones also contain minor thin shaly sandstone and claystone lenses which vary in size both vertically and laterally in the section (See *Figure G-1* on next page). Per well log correlation the top of the injection zone occurs at 4,910' TVD and is 590' in gross thickness (5,500' Well TD). The confining zone is both the overlying Glenns Ferry Formation and the upper and middle Chalk Hills formation. These formations are very widely distributed in this basin and are typically very impermeable claystones. (See *Figure G-2* on page 8). In the DJS Properties 2-14 well the Glenns Ferry formation (approx. 250'-1,600' TVD) is composed of highly impermeable lacustrine Claystone, as well as scattered arkosic sandstones. The upper and middle Chalk Hills formation (approx. 1,600'-4,910'TVD) contains more lacustrine claystone, silicic volcanic ash, and basalt. Per well log correlation the top of the confinement zone is found at 250' TVD and is 4,660' thick. The Pierce Gulch Aquifer is found at the surface and is 250' thick. The Pierce Gulch aquifer is comprised of laminated sandstones interbedded with siltstones and clays.

Geology of the Injection Zone is described *on Figure G-3*, Pages 9-14.

Zone Function	Depth	Thickness	Geologic Name	Lithological Description
USDW Zone:	**Surface – 250’ TVD**	**250’**	**Pierce Gulch Aquifer**	**Sandstone, Claystone/Siltstone**
Confining Zones:	**250’ TVD**	**1,350’**	**Glenns Ferry Formation**	**Lacustrine Claystone**
	1,600’ TVD-4,910’ TVD	**3,310’**	**Upper and Middle Chalk Hills Formation**	**Lacustrine, Claystone and Fluvial Sediments, Silicic Volcanic Ash and Basalt**
Injection Zone:	**4,910’ TVD to TD 5,500’TVD**	**590’**	**Lower Chalk Hills Formation**	**Quartz Rich Sandstone**

The fracture pressure in the lower Chalk Hills Formation @5390’ has been estimated at 3214 psi, based on a 12 ppg equivalent fluid density. A leak off test will be run during the completion procedure to verify the fracture pressure of the confining zone as necessary. Dipole sonic data may become available prior to the completion construction procedure, and will be utilized instead of performing a leak off test to provide the capability to calculate Poisson’s ratio and the associate frac gradients in the injection and confining zones. In addition, a step-rate test will be run prior to injection operations to determine actual fracture pressure in the injection zone. Injection operations will be controlled to always provide at least 50 psi below that pressure.

DJS 2-14 Composite Lithological Section

Figure G-1

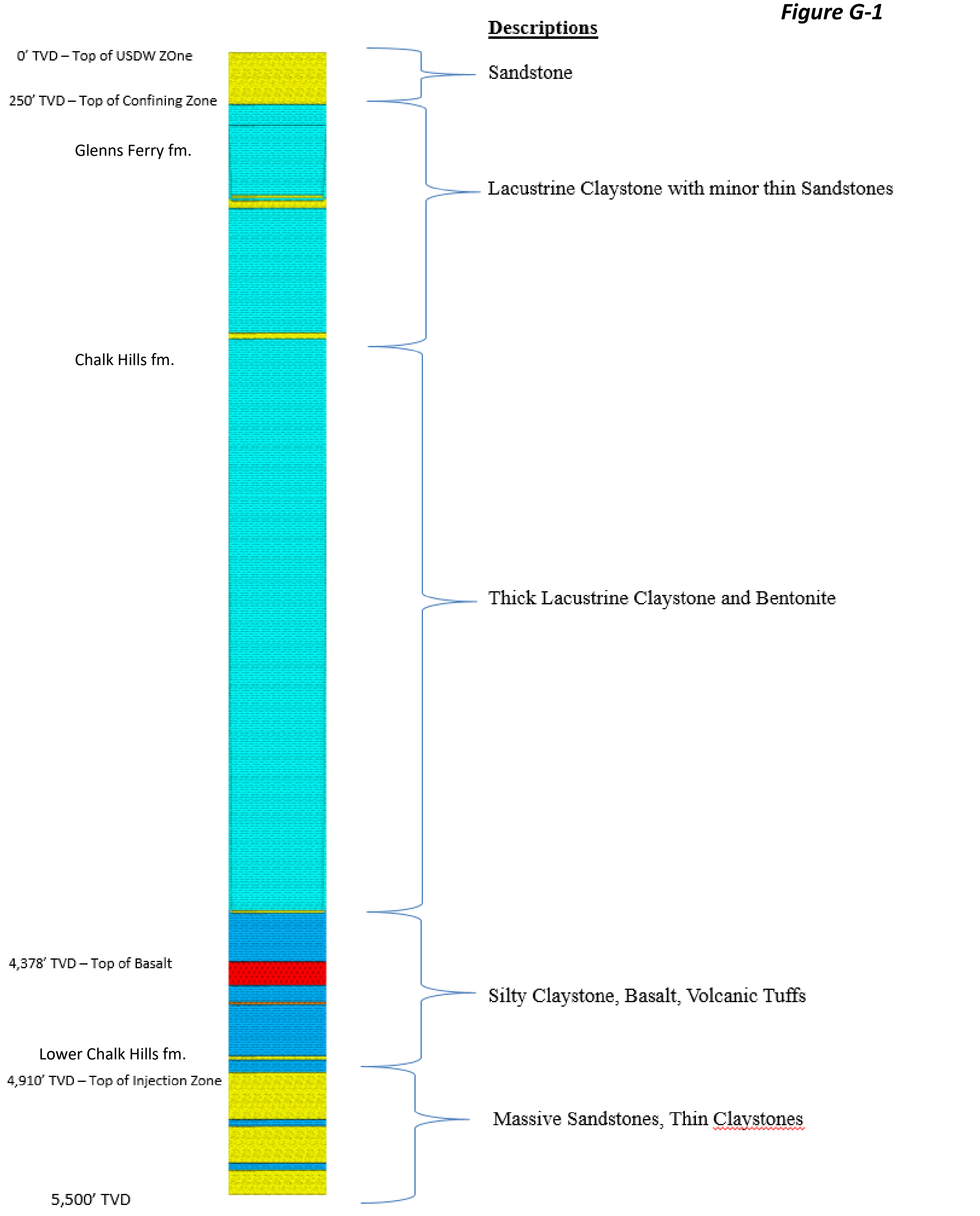


Figure G-2

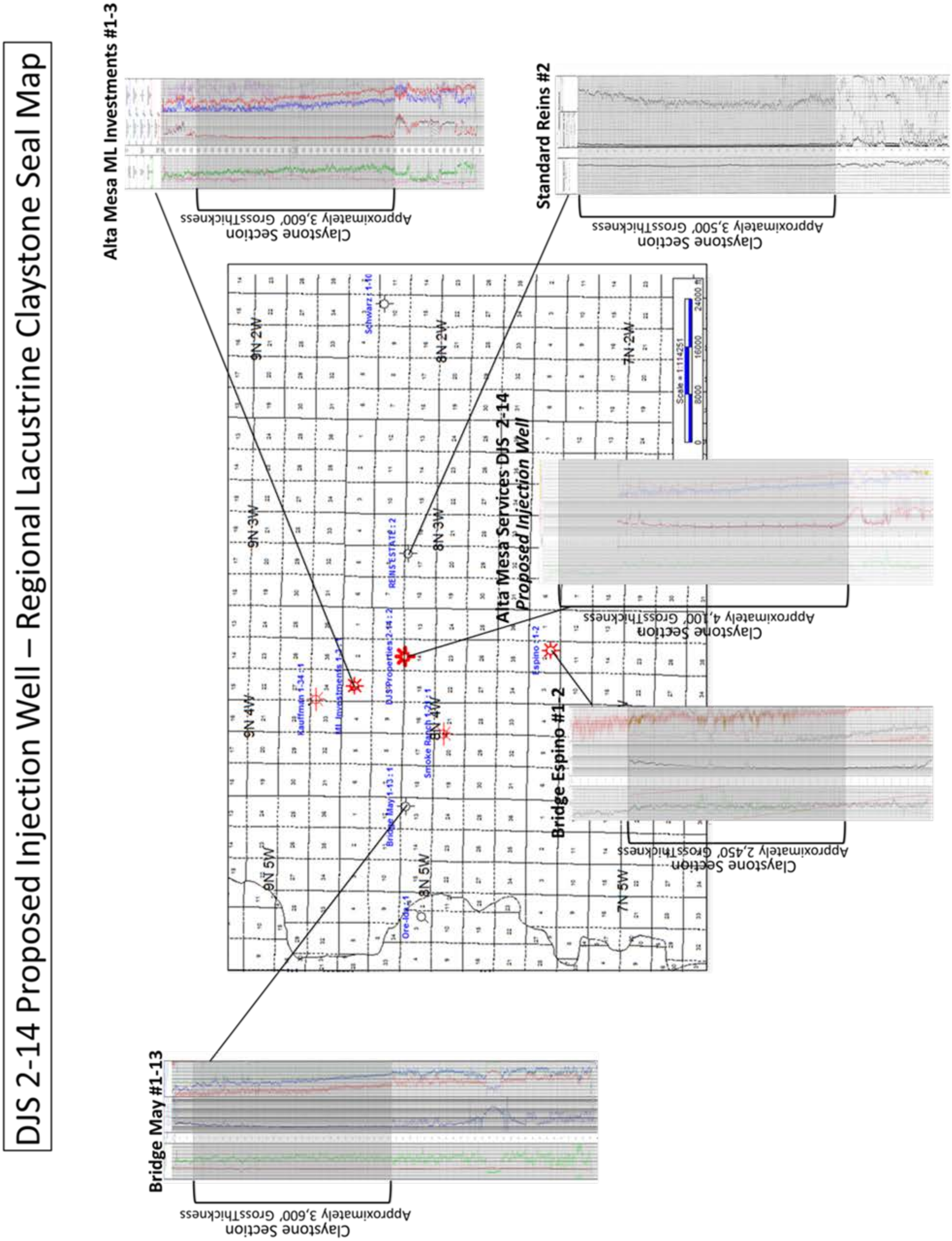

DJS 2-14 Proposed Injection Well – Regional Lacustrine Claystone Seal Map
Alta Mesa ML Investments #1-3
Claystone Section
Approximately 3,600' GrossThickness
Standard Reins #2
Claystone Section
Approximately 3,500' GrossThickness
Alta Mesa Services DJS 2-14
Proposed Injection Well
Claystone Section
Approximately 4,100' GrossThickness
Bridge Espino #1-2
Claystone Section
Approximately 2,450' GrossThickness
Bridge May #1-13
Claystone Section
Approximately 3,600' GrossThickness
9N 2W
9N 3W
9N 4W
9N 5W
8N 2W
8N 3W
8N 4W
8N 5W
7N 2W
7N 5W
Schwarz 1-10
REINS ESTATE 2
DJS Properties 2-14 2
ML Investments 1-3
Kauffman 1-34 1
Smoke Ranch 1-21 1
Bridge May 1-13 1
Espino 1-2
Ore-Ida 1
0
8000
16000
24000 ft

Figure G-3

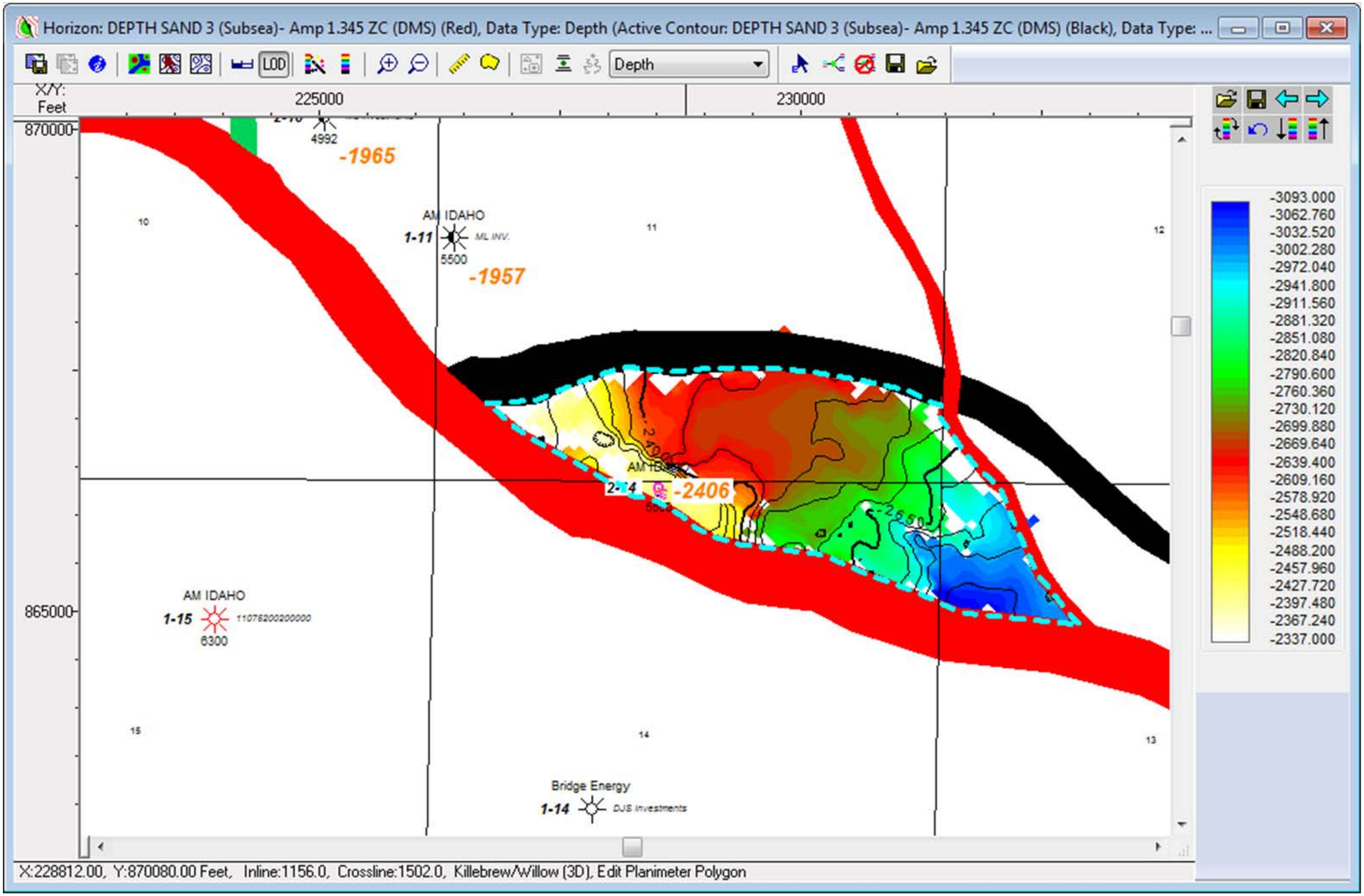
AM Idaho DJS #2-14 Proposed Disposal Well Geologic Setting

Township: 8 North - Range: 4 West - Section 14

Payette County , Idaho

The following structure and Isopach maps were created from interpreting proprietary 3-D seismic data in conjunction with subsurface well control. Subsurface to seismic ties were done by making synthetic seismograms and verifying ties with seismic modelling. Due to the subsurface presence of basalts (very high acoustic impedance), the seismic to subsurface ties are excellent. The quality of the seismic data is very good to excellent, lending strong confidence to the interpretations Presented herein.

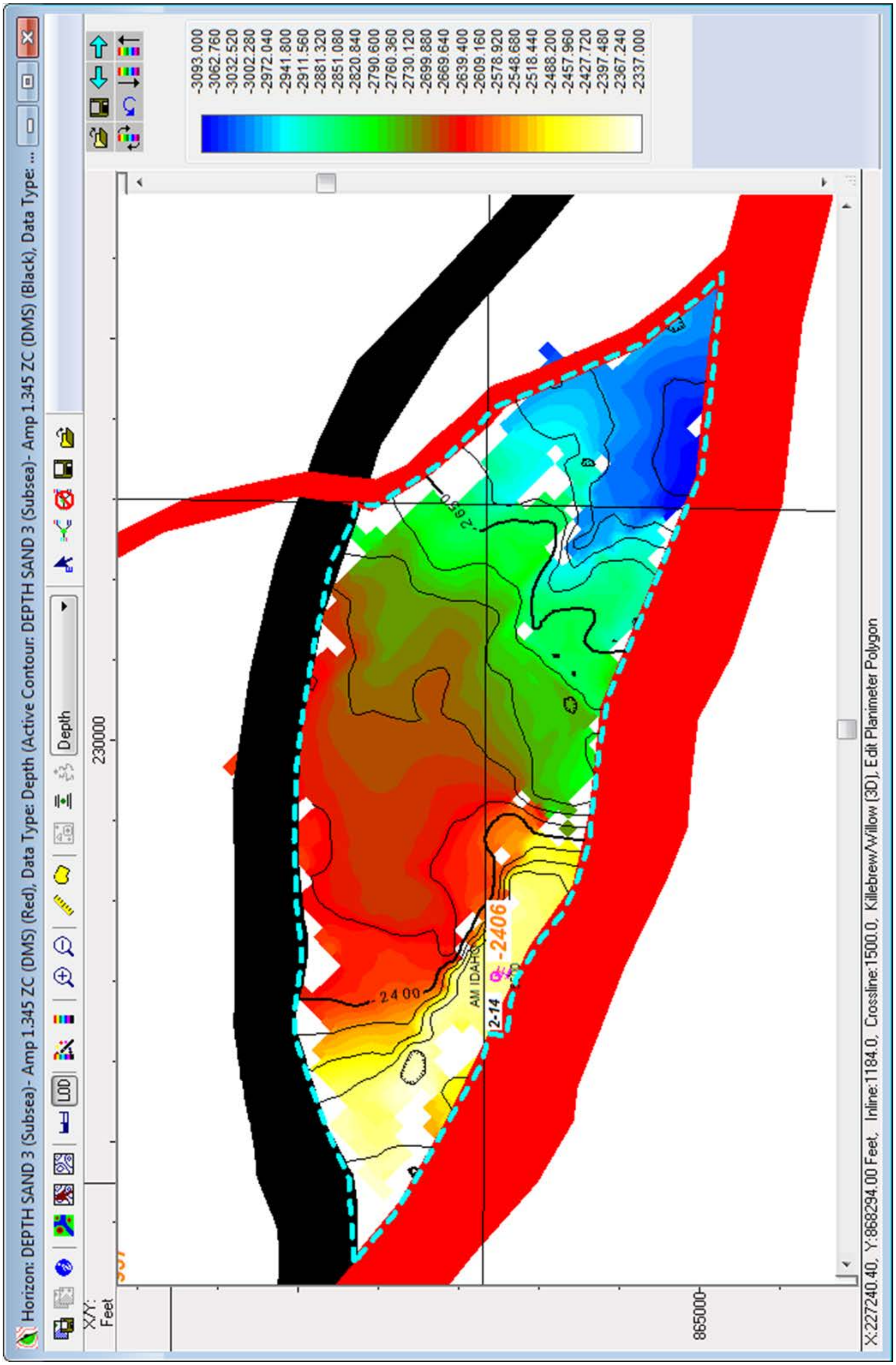
Structure Map (subsea): Top Sand 3
Proposed Injection Zone - Scale 1”: 1000’



DMS 9/2017

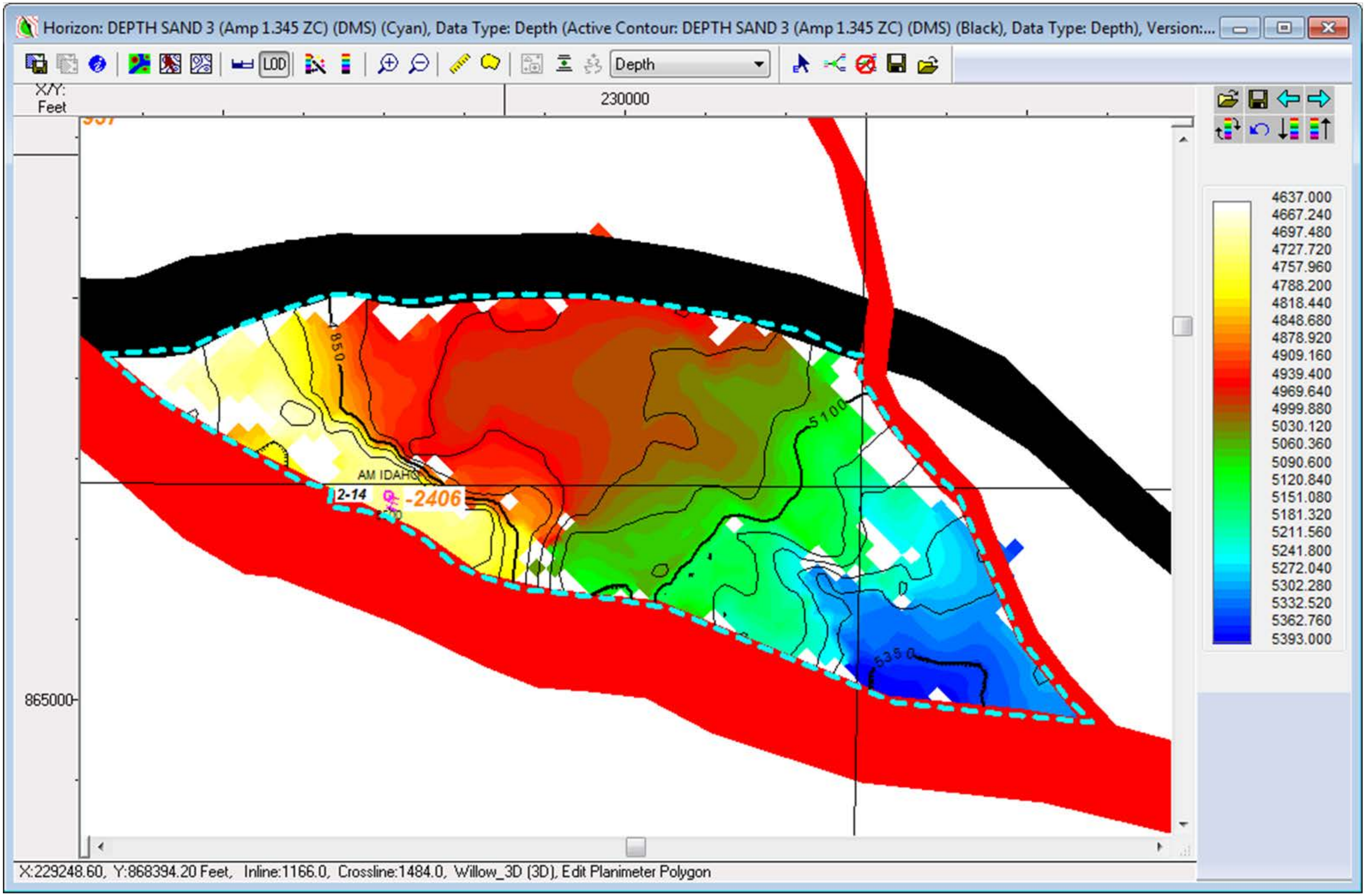
Structure Map (subsea): Top Sand 3

Proposed Injection Zone - Scale 1": 600'



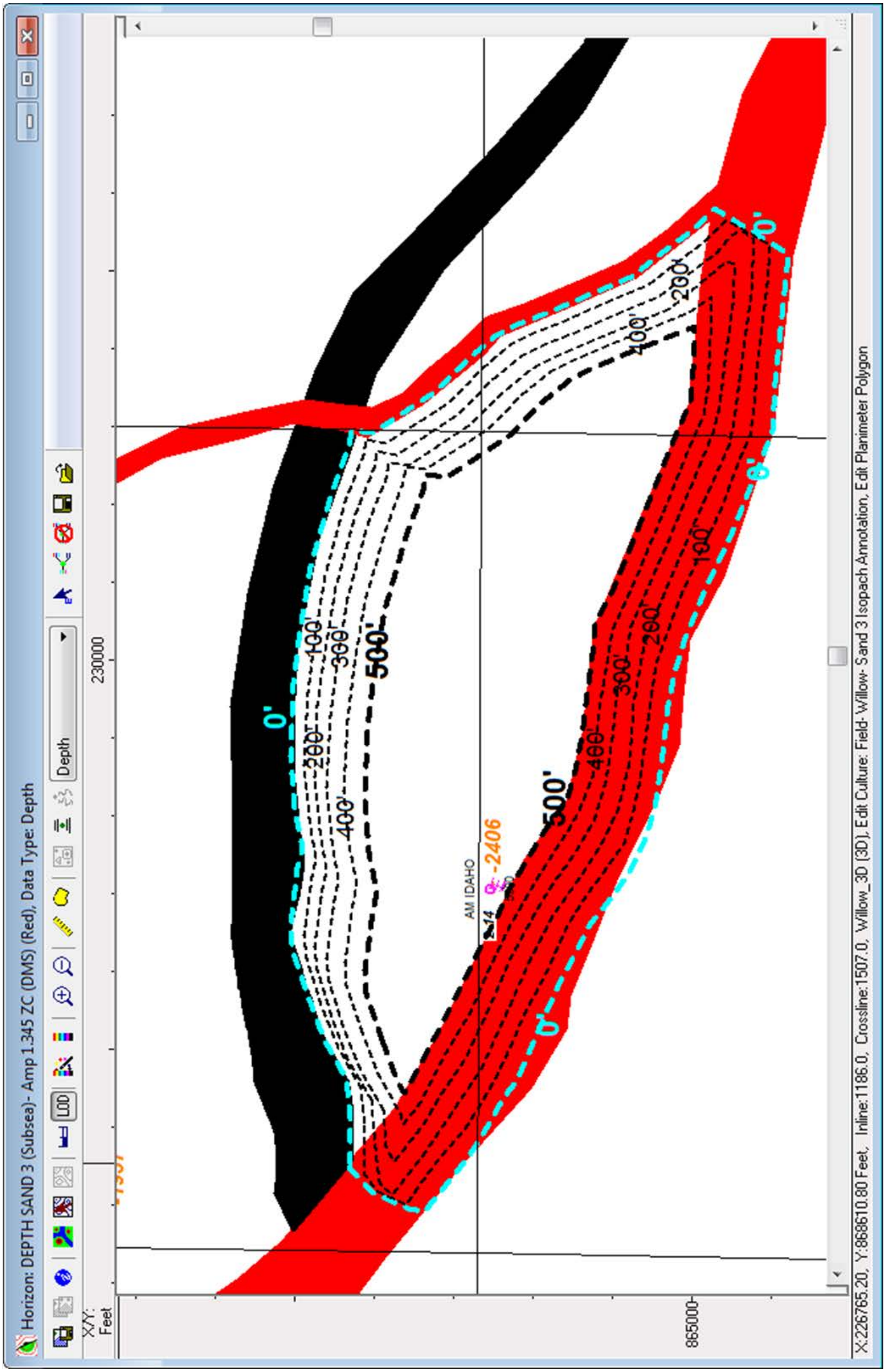
DMS 9/2017

Structure Map (below Ground level datum of 2300' ASL): Top Sand 3
Proposed Injection Zone - Scale 1": 600'



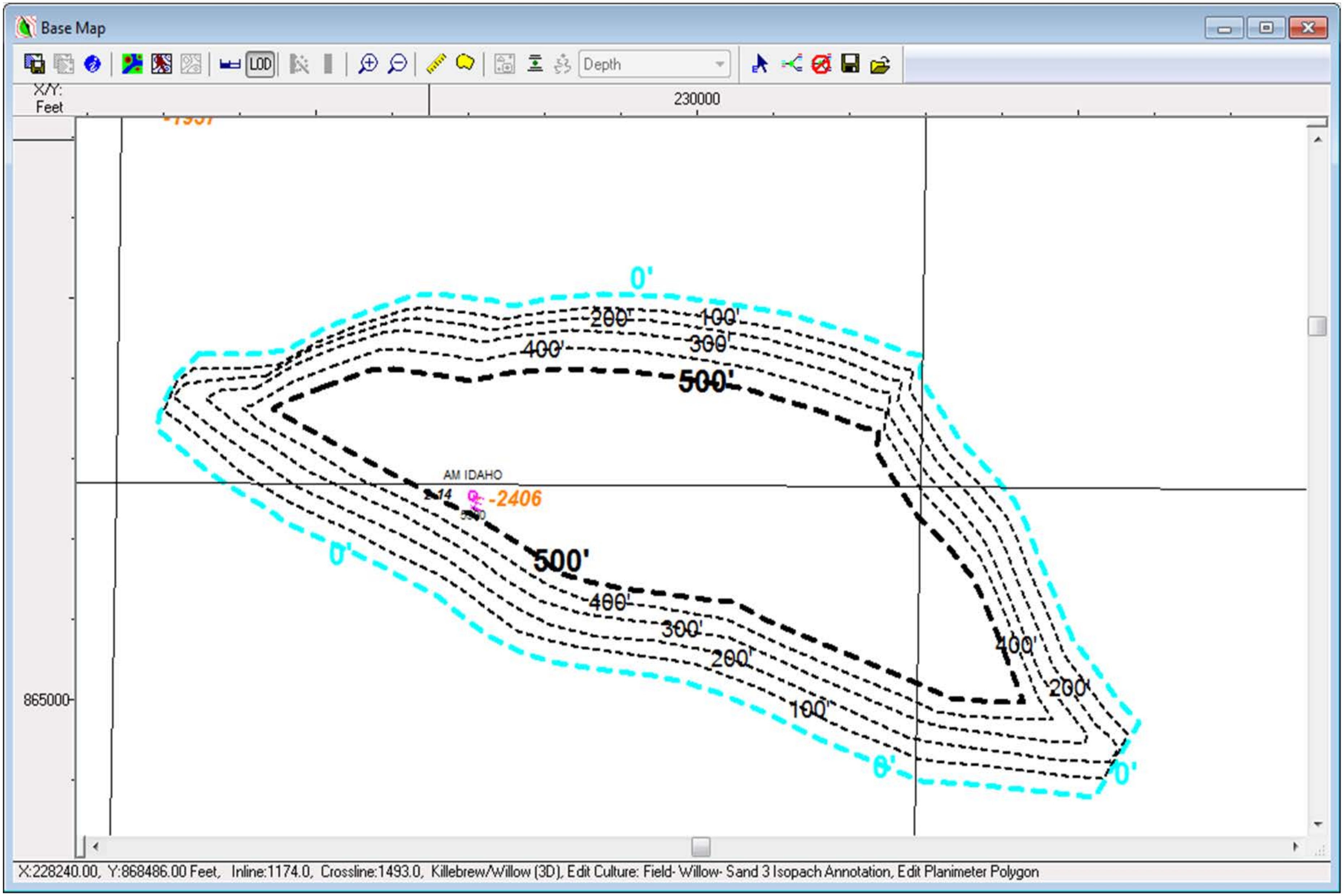
DMS 9/2017

Isopach Map of Sands 3,4,5 –showing Faulting
100' Contour Interval – Scale 1":600'



DMS 9/2017

Isopach Map of Sands 3,4, & 5
Scale 1":600'



DMS 9/2017

ATTACHMENT H

H. OPERATING DATA – The expected average daily rate and volume is 1000 barrels per day (BPD) / 1000 barrels (BBL). The maximum daily rate and volume is expected to be 2600 BWPD / 2600 BBL, based on a mechanistic hydraulic model of the wellbore tubulars and the reservoir characteristics.

The average and maximum surface injection pressures are estimated to be 199 (psig) and 628 psig, respectively, based on the hydraulic model.

The tubing / casing annulus will be filled with 8.8 lb/gallon potassium chloride water, supplemented with an appropriate corrosion inhibitor, biocide, and oxygen scavenger chemical additive package.

A step-rate test will be performed after initial commissioning of the injection facilities and well. The step rate test will allow the reservoir parting pressure to be determined and subsequent injection rates will be limited to maintain injection pressures at least 50 psi below this pressure.

The source of the injection fluid is produced water, associated with the oil and gas production operations of wells operated by AM Idaho LLC in the surrounding area. An analysis of the produced water is attached (See below - Wastewater Characteristics, EPA Methods). The produced water in this area is very low salinity and low TDS since the geologic sedimentary history is that of a lacustrine nature.

Wastewater Characteristics, EPA Methods

Alta Mesa	Date	Alkalinity (mg CaCO3/L)	Barium (mg/L)	BOD (mg/L)	Boron (mg/L)	Calcium (mg/L)	Chloride (mg/L)	COD (Mg/L)	Conductivity (umhos/cm)	Cyanide (free) (mg/L)	Fluoride (mg/L)	Hexane extractable material (HEM) (mg/L)	Gross Alpha (pCi/L)	Gross Beta (pCi/L)	Iron (mg/L)	Manganese (mg/L)	Mercury-CVAFS (mg/L)	NO3/N (mg/L)	Potassium....(mg/L)	Radium 226 (pCi/L)	Radium 228 (pCi/L)	Methanol (mg/L)	Silica (as SiO2) (mg/L)	Silicon (mg/L)	Sodium (mg/L)	TDS (mg/L)	TSS (mg/L)	Strontium (mg/L)	Sulfate (mg/L)	MBAS (mg/L)	Turbidity (NTU)
WP4-1	March 13, 2017	525	0.315	>38.0	7.61	70.7	874	277	4320	0.0131	1.89	7.2	0.120 +/- 5.49	592 +/- 31.8	2.54	0.240	4.31	0.477		0.516 +/- 0.292	0.972 +/- 0.220	9470	50.9	23.8	404	2910	12.4	2.15	47.3	0.137	9.66
Tank Battery	May 23, 2016	419	0.144		6.93	16.1	143		1700	0.0197	7.77		0.013 +/- 1.62	20.4 +/- 4.00	2.33		0.476		40.8	0.05 +/- 0.10	-0.136 +/- 0.555	667	77.5	36.2	314	1420	15.7	0.508	9.58	0.166	48.5

Wastewater Characteristics, EPA Methods

Alta Mesa	Date	Diesel (mg/L)	Lube Oil (mg/L)	Gasoline (mg/L)	1,2,4-Trimethylbenzene (ug/L)	1,3,5-Trimethylbenzene (ug/L)	Acetone (ug/L)	Benzene (ug/L)	Ethylbenzene (ug/L)	Isopropylbenzene (ug/L)	m+p-Xylene (ug/L)	Methyl ethyl ketone (MEK) (ug/L)	Naphthalene (ug/L)	n-Propylbenzene (ug/L)	o-Xyllene (ug/L)	Toluene (ug/L)	1-Methylnaphthalene (ug/L)	2,4-Dimethylphenol (ug/L)	2-Methylnaphthalene (ug/L)	2-Mehtylphenol (ug/L)	3+4-Mehtylphenol (ug/L)	Bis(2-Ethylhexyl)phthalate (ug/L)	Fluorene (ug/L)	Naphthalene (ug/L)	Phenanthrene (ug/L)	Phenol (ug/L)	Pyrene (ug/L)
WP5-1 3:00 p.m.	March 13, 2017	438		80.2	178	103	1390	20000	657	41.4	2500	587	44.2	37.4	729	11500											

A calculation of the expected injection reservoir capacity was performed. This calculation assumes a confined reservoir pore space as defined by the isopach of the injection zone in a fault block bounded on 3 sides by faults (see Attachment G for details). The bulk volume is calculated by determining the area of each isopach interval and using the average of the areas to calculate the total bulk injection reservoir volume. A porosity of 23% is estimated from open hole wireline logs for the injection interval. Water saturation is estimated at 80%, with a complimentary 20% gas saturation. This is based on the swab test of the 5380-5390 perforations, where gas blows were experienced and a water sample showed the presence of Benzene and other VOC's naturally associated with water associated with hydrocarbon reservoirs. The average net reservoir to bulk thickness ratio is estimated at 90% from a review of the mud log for this interval. The pore space is estimated to contain 152 million reservoir barrels. Under confined injection, the water, gas, and pore space will compress and expand respectively to allow for water influx as pore pressure increases. The maximum allowable pressure is defined by staying 10% below fracture pressure. Fracture pressure is estimated to be equivalent to a 12 lb/gallon gradient (3214 psi at 5150'). Note that the actual parting pressure will be well defined upon completion of the well by the execution of a step rate test. The original pressure is estimated at a pressure equal to an 8.6 lb/gall on equivalent pressure gradient (2276 psi at 5150'). The maximum allowable pressure used in the calculation of Injection Zone Capacity is 90% of the fracture pressure (90% of 3214 = 2892 psi). This provides for an allowable increase in the reservoir pressure of 616 psi (2892-2276). Water, gas, and pore space compressibility's are estimated using standard oil and gas industry correlations. Based on the original reservoir volume, along with the allowable pressure increase and the sum of the compressibilities, it is estimated that a total of 7,773 thousand reservoir barrels can be injected into this space before the pressure limit is reached. This equates to 7,368 thousand stock tank barrels based on a water reservoir volume factor of 1.055 RB/STB.

Calculation of Confined Injection Zone Capacity

DJS Properties #2-14 Injection Zone

Calculation of Reservoir Volumes:

Porosity	0.23	fraction	from well log
Sw	0.80	fraction	water saturation - evidence of gas in swab testing and water analysis
Sg	0.20	fraction	gas saturation - evidence of gas in zone from swab testing - residual gas
Gross Volume	94,700	acre-ft	from planimetry calculations below
Net/Gross Ratio	0.90	fraction	from well logs
Pore Volume	19,603	acre-ft	

Reservoir Isopach Area Planimeter Readings:

CONTOUR LINE VALUE	AREA > (acres)	RATIO OF AREAS	DELTA CONTOUR (ft)	DELTA VOLUME (acre-ft)	
0	269.00				
100	234.00	0.8699	100	25,150.0	
200	205.00	0.8761	100	21,950.0	
300	173.00	0.8439	100	18,900.0	
400	144.00	0.8324	100	15,850.0	
500	113.00	0.7847	100	12,850.0	
		TOTAL ==>		94,700.0	acre-ft - gross bulk reservoir volume

Injection Zone Capacity

Item	Value	Units	Comments - notes
Datum Depth:	5150	ft, BGL	average depth of injection zone
Average Temperature	251	deg F	ML Investments 1-3 production log
Initial Pressure:	2276	psi	8.6 ppg equivalent pore pressure at datum depth
Fracture Pressure:	3214	psi	12 ppg equivalent pore pressure at datum depth
Maximum Allowable Pressure	2892	psi	90% of fracture pressure
Maximum Pressure Increase (dP)	616	psi	maximum allowable pressure less initial pressure
Average Pressure	2584	psi	average of initial pressure and maximum allowable pressure
Water Salinity	750	ppm Cl	estimated average
Water Compressibility	3.48E-06	1/psi	Osif's Correlation
Gas Compressibility	3.87E-04	1/psi	Meehan et al, Gas gravity = 0.65 from ML Investments 1-10 Well
Rock pore volume compressibility	3.50E-06	1/PSI	Hall's Correlation
Reservoir Water Volume Initial	15,682	acre-ft	Pore Volume * Sw
Reservoir Water Volume Initial	121,663,439	RBbls	Pore Volume * Sw
Reservoir Water Volume Compression	261,022	RBbls	dP * water compressibility* initial water volume
Reservoir Gas Space Volume Initial	3,921	acre-ft	Pore Volume * Sg
Reservoir Gas Space Volume Initial	30,415,860	RBbls	Pore Volume * Sg
Gas Pore Space Compression	7,250,191	RBbls	dP * gas compressibility * initial gas volume
Pore Space Volume Increase	262,281	Rbbls	dP * pore space compressibility
Total Pore Space volume increase	7,773,494	RBbls	sum of water, gas, and pore space compression
Bw (water formation volume factor):	1.055	RBbl/STBbl	McCain's Correlation
Total Stock Tank Barrels Capacity	**7,368,241**	**STBbls**	adjust to surface conditions by dividing by water formation volume factor (Bw)

Stock tank barrels are measured at atmospheric pressure and 60 degrees F.

ATTACHMENT I

I. **FORMATION TESTING PROGRAM –** A step rate test will be run at the time of initial completion to determine the actual parting pressure of the injection interval after the packers and tubing is installed. The water used in this test will be from the same source as the proposed source water. Surface injection pressure and injection rates will be measured during the step rate test. The determination of bottom hole parting pressure will be indicated by a departure in the injectivity ratio (dRate/dPressure) when the parting pressure is exceeded. The pressure defined by the intersection of the slopes of the injectivity data below and above parting pressure will define the surface maximum injection pressure. All injection operations will be held to 50 psi or more below this pressure to assure that fracturing of the injection interval does not occur. Bottom hole pressures will be calculated based on the density of the fluid being injected, along with surface pressure measurements. Water samples were collected and analyzed on the interval at 5380-90' and is believed to be representative of the entire interval being proposed for injection.

ATTACHMENT J

J. **STIMULATION PROGRAM –** No stimulation program is expected to be needed. The sandstone in this area has good permeability and the unstimulated injectivity should be sufficient.

ATTACHMENT K

K. **INJECTION PROCEDURES** – Individual monitoring of the DJS Properties #2-14 is planned. Gauges will be installed at the wellsite, and a flow meter will be installed at the pump station. Casing pressure will be maintained at 0 psig. If any pressure is noted on the annulus between the tubing and the production casing, injection will immediately be halted. Injection will not be resumed until the source of the pressure has been identified and repaired. Injection pressure at the wellhead on the tubing will be maintained 50 psi below parting pressure. An initial step-rate test will be performed to determine parting pressure to beginning injection operation. Produced water will be gathered into stock tanks and through additional settling and filtration vessels, as necessary to assure clean water is pumped downhole. A polish filter will be installed at the wellhead to catch any solids that make their way to the wellhead. An injection pump will be located near the stock tanks to pressurize the water and transport the water via flowline to the wellhead. A pressure relief valve will be installed on the pump to prevent excessive pressure from being placed on the flowline. This relief valve will be piped back to the source tanks or to the intake of the pump. Source water will be provided by the producing wells. The flowline will be buried below grade to avoid freezing issues. The portion of the flowline above grade will have insulation and heat tracing to avoid freezing during winter operations. The flowline easement and wellhead will be visually inspected daily (within reason, due to considerations of weather and other force majeure) by field operating personnel.

ATTACHMENT L

L. **CONSTRUCTION PROCEDURES** –

<u>Historical:</u>

Spud well 9/11/2014. Surface hole was drilled with 12 ¼" bit to 1093'. 9 5/8" 40 lb/ft K-55 LTC casing was then set at 1082' and was cemented back to surface. An 8.75" hole was drilled to 5,500' and production casing was then run and cemented (7" 26 lb/ft J-55 LTC casing with bow spring centralizers). A top down cement job was then performed on the 7" casing, to provide cement coverage between the production casing and the surface casing down below the shoe of the surface casing. The prospective hydrocarbon intervals were then tested by perforating and flow/swab tested each of 5 intervals between 5390' and 4306'. All tested non-commercial. The first zone at 5380-5390' did have good gas blows during swabbing. Cement retainers or bridge plugs were set between intervals during the testing operations which proceeded from the bottom to the top interval, and was also placed above last interval after testing. Testing was completed by 11/3/2014. See attached wellbore diagram.

<u>Planned Injection Completion Construction:</u>

1. Move in workover rig.
2. Pressure test casing above bridge plug at 4,294'
3. Drill out plugs and retainers to below float collar to 5,450'. If dipole sonic data is not available, run leak-off test prior in the Confining Zone to verify fracture gradient in the Confining Zone.
4. Add perforations in interval 5390 – 5410'.
5. Run tubing, packer and isolation packer to 4860' and set upper packer at 4200'. (see attached wellbore diagram).
6. Install wellhead assembly.
7. Run step rate test with actual produced water to determine parting pressure and injectivity.
8. Connect gauges and filter pod, flowline, pump, and commission injection system.

ATTACHMENT M

M. **CONSTRUCTION DETAILS** – See the following pages for wellbore schematics.

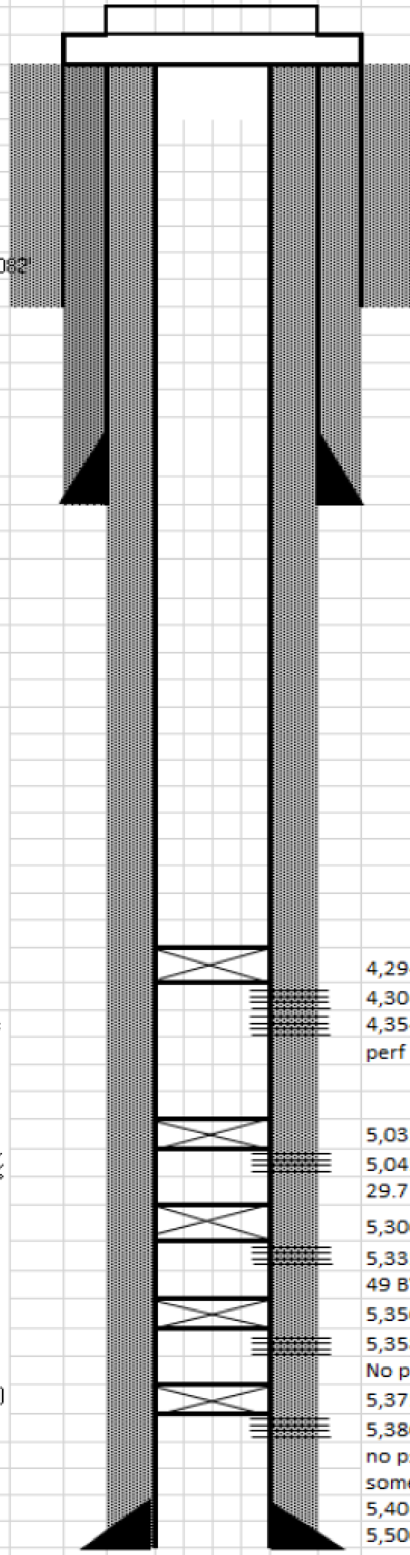
Well: DJS 2-14

Willow Field - Payett County, ID

Current Wellbore Diagram as of 11/3/2014 - Well Temporarily Abandoned

Spud 9/12/2014 T&A'd 11/3/2014

GL Elevation above MSL: 2,488'



Casing & Cement

Conductor : 13 3/8 OD, @ 80'

Surface: 24 jts, 9-5/8" OD, 8.83 ID,40#, K-55 @ 1,082'

215 Sacks, (144 Bbls) Type III Cement + Slurrylite 50 Pps, 20% MS-500, 5% HW Gypsum, 5% Salt B.W.O.W., 0.75% TSFL-180, 0.25% CFL-300, 3.77 ft3/sk, 14.22 gal/sk, 10.4 ppg. Followed by 70 sacks, (17 Bbbls) Type III Cement + 5% Salt B.W.O.W., 1.36 ft3/sk, 6.42 gal/sk, 14.8 ppg.

Pump Top Job as Follows: Pump 116 sacks (23 Bbls) Calprem Cement + 2% Cacl2, 1.15 ft3/sk, 5 gal/sk, 15.8 ppg. Pump Top out cement @ 1.0 Bpm & 100 psi. (4 Bbls Cement to surface)

Production: 7" OD, 6.276" ID, J-55 @5,500'

Run 122 Total joints of 7", 26# J-55, LTC Casing as follows:

Float Shoe set @ 5,500', 2 Joints of Casing, Float collar set @ 5,406', 120 Joints of casing. Ran 64 Total 7" X 8 1/2" Bow Spring Centralizers, 1- Centralizer 10' above Shoe, 1- Centralizer on 1st casing Collar, 1- Centralizer 10' Below Float Collar, Centralizer on every Joint to Joint # 44 @ 3,509'. Then every 4th Joint to Joint #120 @ 80'. Centralizers Where Installed on collars on Casing Joints. Filled & circulated every 20 joints (No tight hole or problems Running Casing) (Tag with Joint #122 @ 5,500');

Cement as Follows: Pump 10 bbls of Diesel, 25 bbls of 10.0 Ppg Weighted Spacer @ 4.0 Bpm and 250 psi, Followed by 400 Sacks, (129 Bbls) TCI lite 61.6 Pps, Class G Cement, 25.9 Pps Flyash, 5.22 Pps gel, 1.82 ft3/sk, 9.72 gal/sk, 12.7 ppg. Pump Lead cement @ 3 Bpm & 340 psi. Followed by 265 Sacks, (54.7 Bbbls) Gas Seal Cement, Class G Cement, 3% Salt, 0.75% TSFL-180, 0.2% C-49, 1.16 ft3/sk, 4.9 gal/sk, 16.0 ppg. Pump Tail cement @ 3 Bpm & 239 psi. Displace with 208 Total Bbls as Follows: 152 Bbls 4% KCL Water @ 2 Bpm & 1300 Psi, (Lost Returns With 152 Bbls Displacement Away) (No Returns on last 56 Bbls) Pumped last 56 Bbls Displacement @ 1 Bpm & 3,700 Psi. (Bumped plug With 4,200 psi) Bleed off 2.5 Bbls, Check Floats, Floats Held Good. (No Spacer or Cement to Surface)

Pumped 9 cubic yards cement top-down job.

Well Name & No.: DJS Properties 2-14	Field: Willow
County: Payette	State: Idaho
Total Depth (MD): 5,500'	(TVD) 5,500'
Date Completed: T&A on 11/3/2014	Latest Revision Date: 2/3/2015

EPA – UNDERGROUND INJECTION CONTROL PERMIT APPLICATION ATTACHMENTS

Well: DJS 2-14

Willow Field - Payette County, ID

Proposed Injection Completion Configuration

Spud 9/12/2014 T&A'd 11/3/2014

GL Elevation above MSL: 2,488'

Casing & Cement

Conductor : 13 3/8 OD, @ 80'

Surface: 24 jts, 9-5/8" OD, 8.83 ID,40#, K-55 @ 1,082'

215 Sacks, (144 Bbls) Type III Cement + Slurrylite 50 Pps, 20% MS-500, 5% HW Gypsum, 5% Salt B.W.O.W., 0.75% TSFL-180, 0.25% CFL-300, 3.77 ft3/sk, 14.22 gal/sk, 10.4 ppg. Followed by 70 sacks, (17 Bbbls) Type III Cement + 5% Salt B.W.O.W., 1.36 ft3/sk, 6.42 gal/sk, 14.8 ppg.

Pump Top Job as Follows: Pump 116 sacks (23 Bbls) Calprem Cement + 2% Cacl2, 1.15 ft3/sk, 5 gal/sk, 15.8 ppg. Pump Top out cement @ 1.0 Bpm & 100 psi. (4 Bbls Cement to surface)

Production: 7" OD, 6.276" ID, J-55 @5.500'

Run 122 Total joints of 7", 26# J-55, LTC Casing as follows:

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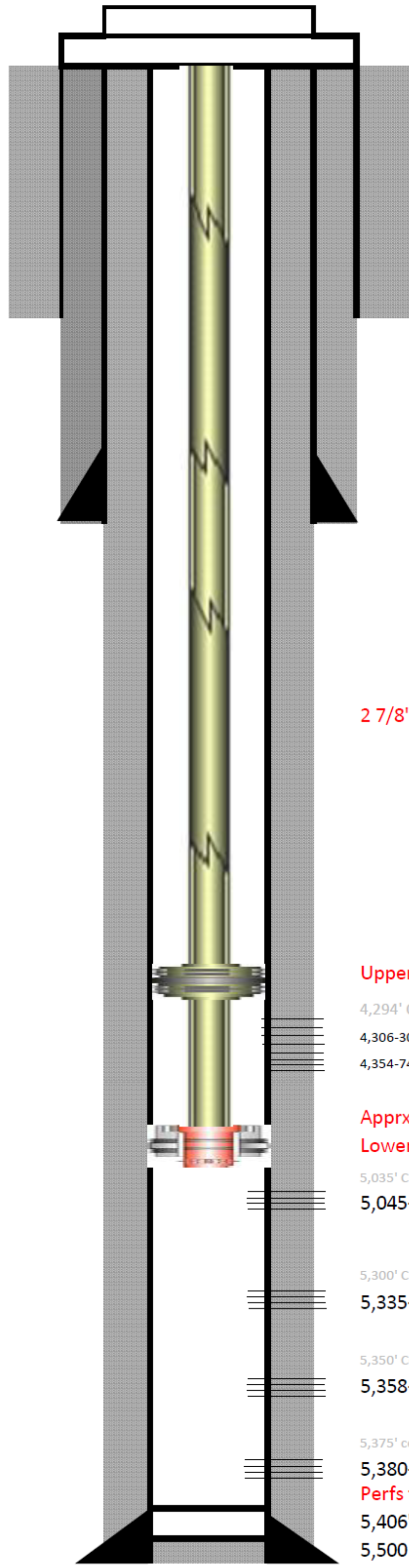
Cement as Follows: Pump 10 bbls of Diesel, 25 bbls of 10.0 Ppg Weighted Spacer @ 4.0 Bpm and 250 psi, Followed by 400 Sacks, (129 Bbls) TCI lite 61.6 Pps, Class G Cement, 25.9 Pps Flyash, 5.22 Pps gel, 1.82 ft3/sk, 9.72 gal/sk, 12.7 ppg. Pump Lead cement @ 3 Bpm & 340 psi. Followed by 265 Sacks, (54.7 Bbbls) Gas Seal Cement, Class G Cement, 3% Salt, 0.75% TSFL-180, 0.2% C-49, 1.16 ft3/sk, 4.9 gal/sk, 16.0 ppg. Pump Tail cement @ 3 Bpm & 239 psi. Displace with 208 Total Bbls as Follows: 152 Bbls 4% KCL Water @ 2 Bpm & 1300 Psi, (Lost Returns With 152 Bbls Displacement Away) (No Returns on last 56 Bbls) Pumped last 56 Bbls Displacement @ 1 Bpm & 3,700 Psi. (Bumped plug With 4,200 psi) Bleed off 2.5 Bbls, Check Floats, Floats Held Good. (No Spacer or Cement to Surface)

Pumped 9 cubic yards cement top down surface job.



5,500' TVD

Well Name & No.: DJS Properties 2-14	Field: Willow
County: Payette	State: Idaho
Total Depth (MD): 5,500'	(TVD) 5,500'
Date Completed: T&A on 11/3/2014	

ATTACHMENT O

O. PLANS FOR WELL FAILURES -- The potential areas of concern for this type well are three points: 1) packer to casing seal, 2) tubing connections or tubing body leak, or 3) tubing hanger seals. For any of these components a leak will be indicated by the existence of pressure on the tubing / casing annulus pressure gauge. These type of leaks will be contained within the wellbore envelope. If pressure is observed on the casing gauge, injection operations will immediately cease. The wellhead will be isolated by closing in all wellhead valves and the pump and flowline valves will be closed. The tubing hanger seals will be inspected using a wellhead service company technician who can pressure test the seals for leaks. After this testing is done, a workover rig will be utilized to repair the leaking seals or to pull the tubing and packer so that they can be inspected for leaks and replaced as necessary. Injection will not be reinstated until the leak is repaired and the annulus is pressure tested to verify integrity of the injection components.

Mechanical integrity tests will be run periodically according to permit requirements by applying pressure on the annulus between the production casing and the tubing. This test is designed to detect any production casing weakness. If any leaks are noted, injection operations will not resume until the leak is located and repaired.

ATTACHMENT Q

Q. PLUGGING AND ABANDONMENT PLAN – See proposed Post-Injection Plugging Configuration wellbore diagram and associated EPA Form 7520-14 which details the proposed plugging and abandonment plan for this well.

Well name: DJS 2-14
Willow Field - Payette County, ID
Proposed post-injection plugging configuration
Spud 9/12/2014 T&A'd 11/3/2014

GL Elevation above MSL: 2,488'

<u>Casing & Cement</u>
***Conductor*:** 13 3/8 OD, @ 80'

***Surface*:** 24 jts, 9-5/8" OD, 8.83 ID,40#, K-55 @ 1,082'
215 Sacks, (144 Bbls) Type III Cement + Slurrylite 50 Pps, 20% MS-500, 5% HW Gypsum, 5% Salt B.W.O.W., 0.75% TSFL-180, 0.25% CFL-300, 3.77 ft3/sk, 14.22 gal/sk, 10.4 ppg. Followed by 70 sacks, (17 Bbbls) Type III Cement + 5% Salt B.W.O.W., 1.36 ft3/sk, 6.42 gal/sk, 14.8 ppg.

<u>Pump Top Job as Follows</u>: Pump 116 sacks (23 Bbls) Calprem Cement + 2% Cacl2, 1.15 ft3/sk, 5 gal/sk, 15.8 ppg. Pump Top out cement @ 1.0 Bpm & 100 psi. (4 Bbls Cement to surface)

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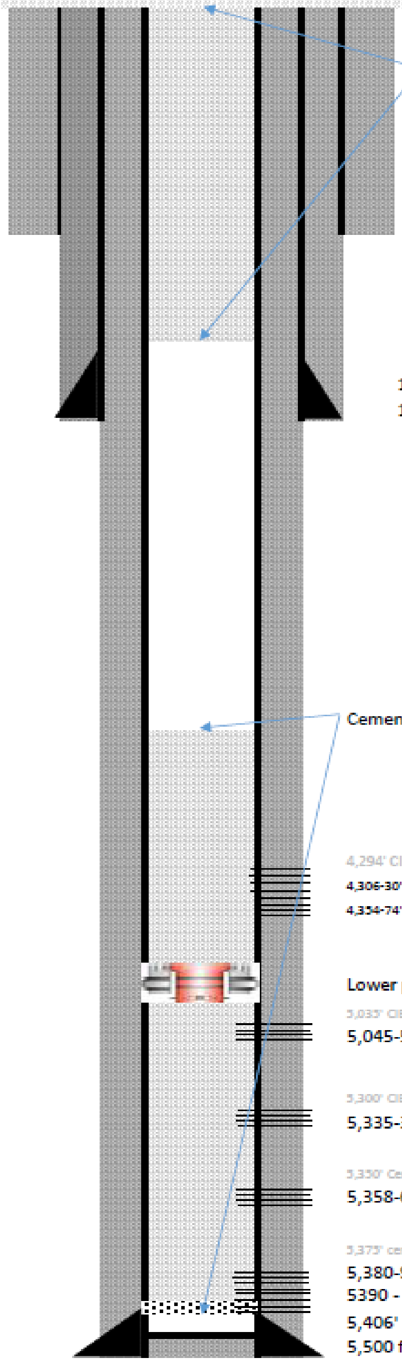
<u>Cement as Follows</u>: Pump 10 bbls of Diesel, 25 bbls of 10.0 Ppg Weighted Spacer @ 4.0 Bpm and 250 psi, Followed by 400 Sacks, (129 Bbls) TCI lite 61.6 Pps, Class G Cement, 25.9 Pps Flyash, 5.22 Pps gel, 1.82 ft3/sk, 9.72 gal/sk, 12.7 ppg. Pump Lead cement @ 3 Bpm & 340 psi. Followed by 265 Sacks, (54.7 Bbbls) Gas Seal Cement, Class G Cement, 3% Salt, 0.75% TSFL-180, 0.2% C-49, 1.16 ft3/sk, 4.9 gal/sk, 16.0 ppg. Pump Tail cement @ 3 Bpm & 239 psi. Displace with 208 Total Bbls as Follows: 152 Bbls 4% KCL Water @ 2 Bpm & 1300 Psi, (Lost Returns With 152 Bbls Displacement Away) (No Returns on last 56 Bbls) Pumped last 56 Bbls Displacement @ 1 Bpm & 3,700 Psi. (Bumped plug With 4,200 psi) Bleed off 2.5 Bbls, Check Floats, Floats Held Good. (No Spacer or Cement to Surface)

Pumped 9 cubic yards cement top down surface job.



Well Name & No.: DJS Properties 2-14	Field: Willow
County: Payette	State: Idaho
Total Depth (MD): 5,500'	(TVD) 5,500'
Date Completed: T&A on 11/3/2014	

EPA – UNDERGROUND INJECTION CONTROL PERMIT APPLICATION ATTACHMENTS

Well name: DJS 2-14
Willow Field - Payette County, ID
Proposed post-injection plugging configuration
Spud 9/12/2014 T&A'd 11/3/2014

GL Elevation above MSL: 2,488'

<u>Casing & Cement</u>
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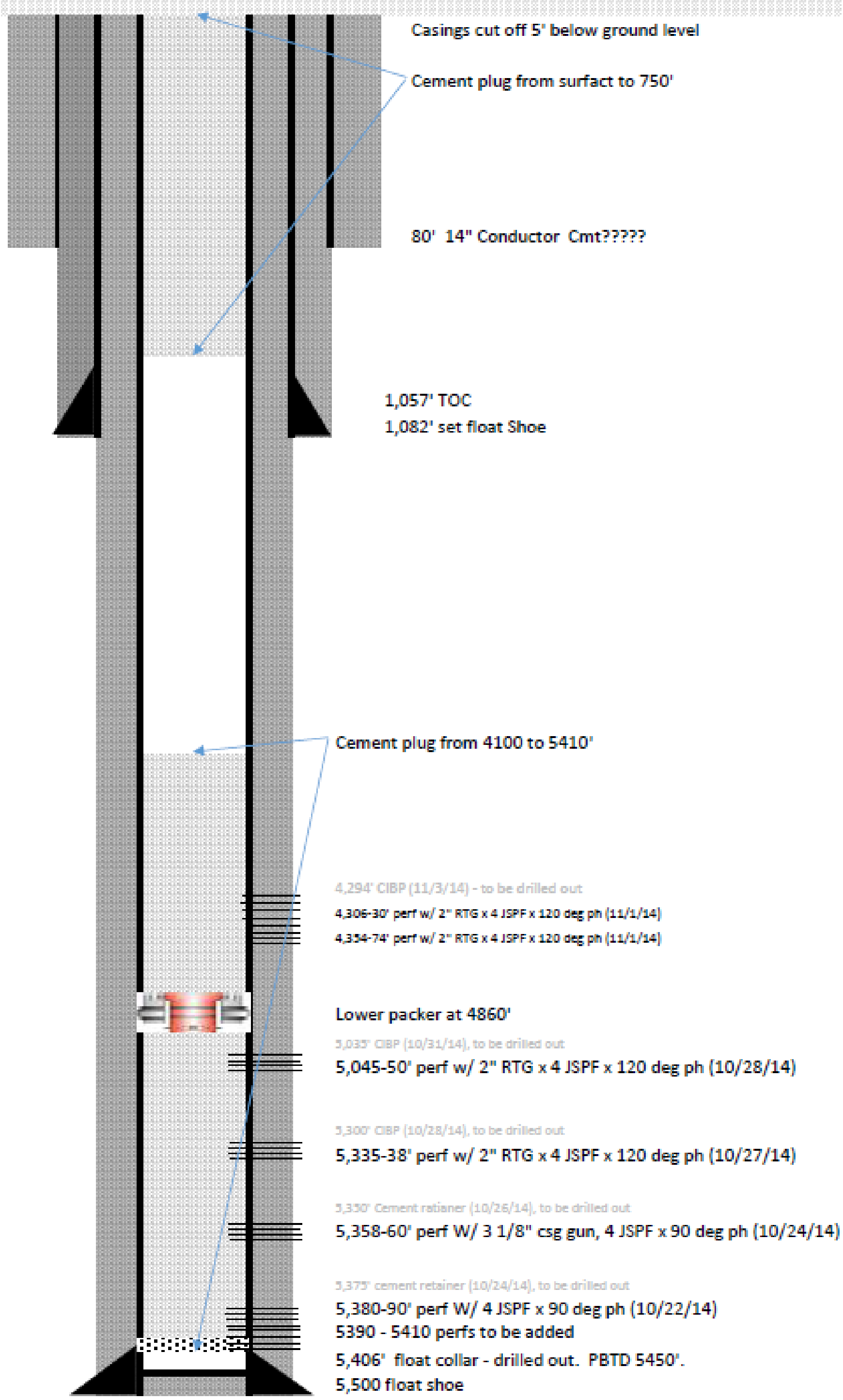
Pumped 9 cubic yards cement top down surface job.



5,500' TVD

Well Name & No.: DJS Properties 2-14	Field: Willow
County: Payette	State: Idaho
Total Depth (MD): 5,500'	(TVD) 5,500'
Date Completed: T&A on 11/3/2014	

OMB No. 2040-0042 Approval Expires 12/31/2018

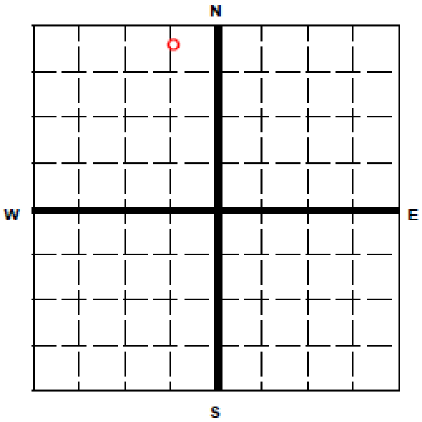
EPA

United States Environmental Protection Agency
Washington, DC 20460

PLUGGING AND ABANDONMENT PLAN

Name and Address of Facility	Name and Address of Owner/Operator
DJS Properties # 2-14	Alta Mesa Services, LP, 15021 Katy Fwy, St 400, Houston, TX 77094

Locate Well and Outline Unit on Section Plat - 640 Acres



State	County	Permit Number
Idaho	Payette	LU600120

Surface Location Description

NE 1/4 of NE 1/4 of NE 1/4 of N 1/4 of Section 14 Township 8N Range 4W

Locate well in two directions from nearest lines of quarter section and drilling unit

Surface
Location 95 ft. frm (N/S) N Line of quarter section
and 2315 ft. from (E/W) W Line of quarter section.

TYPE OF AUTHORIZATION

- [x] Individual Permit
- [ ] Area Permit
- [ ] Rule

Number of Wells 1

Lease Name DJS Properties

WELL ACTIVITY

- [ ] CLASS I
- [x] CLASS II
  - [x] Brine Disposal
  - [ ] Enhanced Recovery
  - [ ] Hydrocarbon Storage
- [ ] CLASS III

Well Number 2-14

CASING AND TUBING RECORD AFTER PLUGGING

SIZE	WT (LB/FT)	TO BE PUT IN WELL (FT)	TO BE LEFT IN WELL (FT)	HOLE SIZE
7"	26	5500	5500	8.75"
9.625"	40	1082	1082	12.75
13.375"	61	120	120	17.5"

METHOD OF EMPLACEMENT OF CEMENT PLUGS

- [x] The Balance Method
- [ ] The Dump Bailer Method
- [ ] The Two-Plug Method
- [x] Other

CEMENTING TO PLUG AND ABANDON DATA:	PLUG #1	PLUG #2	PLUG #3	PLUG #4	PLUG #5	PLUG #6	PLUG #7
Size of Hole or Pipe in which Plug Will Be Placed (inche:	7"	7"					
Depth to Bottom of Tubing or Drill Pipe (ft.	5410	750					
Sacks of Cement To Be Used (each plug)	TBD	TBD					
Slurry Volume To Be Pumped (cu. ft.)	282	162					
Calculated Top of Plug (ft.)	4100	0					
Measured Top of Plug (if tagged ft.)	N/A - future	N/A - future					
Slurry Wt. (Lb./Gal.)	TBD	TBD					
Type Cement or Other Material (Class III)	TBD	TBD					

LIST ALL OPEN HOLE AND/OR PERFORATED INTERVALS AND INTERVALS WHERE CASING WILL BE VARIED (if any)

From	To	From	To
4306	4330 (existing perfs)	5380	5390 (existing perfs)
4354	4374 (existing perfs)	5390	5410 (to be added for injection)
5045	5050 (existing perfs)		
5335	5360 (existing perfs)		

Estimated Cost to Plug Wells

TBD - cement type, volumes, density and type to be determined based on regulatory requirements and products in existence at time of plugging.

Certification

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possiblity of fine and imprisonment. (Ref. 40 CFR 144.32)

Name and Official Title *(Please type or print)*	Signature	Date Signed

EPA Form 7520-14 (Rev. 12-11)

ATTACHMENT R

R. NECESSARY RESOURCES

IDAHO DEPARTMENT OF LANDS

This bond replaces and supersedes Aspen American Insurance Co Bond No. SU46286 effective March 28, 2016.

IDAHO OIL AND GAS CONSERVATION COMMISSION

BOND

Bond No. 1138356

Known all men by these presents, that we: Alta Mesa Services, LP of the County of: Harris in the state of: Texas as principal, and Lexon Insurance Company of 10002 Shelbyville Rd. Suite 100, Louisville, KY 40223 as surety, authorized to do business in this State, are held and firmly bound unto the State in the penal sum as indicated, lawful money of the United States, for which payment, well and truly to be make, we bind ourselves, and each of us, and each of our heirs, executors, administrators or successors, and assigns jointly and severally, firmly by these presents.

The condition of this obligation is that whereas the above bounden principal proposes to drill a well or wells for oil, gas, or stratigraphic purposes in and upon the following described land situated within the State, to wit: *(May be used for blanket bond or for single well)*

See attached Exhibit "A"

NOW, THEREFORE, if the above bounden principal shall comply with all of the provisions of the laws of the State and the rules, regulations and orders of the Conservation Commission of the State, especially with reference to the proper plugging of said well or wells, and filing with the Oil and Gas Conservation commission of this State all notices and records required by said Commission, in the event said well or wells do not produce oil or gas in commercial quantities, or cease to produce oil or gas in commercial quantities, then this obligation is void; otherwise, the same shall be and remain in full force and effect.

Penal Sum of One Hundred Thousand and No/100 ($100,000.00).

Witness our hands and seals, this 28th day of March, 2016.

Principal: Alta Mesa Services, LP

Principal: Michael A. McCabe, CFO

Witness our hands and seals, this 28th day of March, 2016.

Surety (print): Lexon Insurance Company

Surety(signature): Teresa D. Kelly, Attorney-in-Fact

(If the principal is a corporation, the bond should be executed by its duly authorized officers, with the seal of the corporation affixed. When principal or surety executes this bond by agent, power of attorney or other evidence of authority must accompany the bond.)

Idaho Oil and Gas Conservation Commission

Approval Date: ____________ ____________ Secretary

POA #LX-264759

Form No. P-2

This bond replaces and supersedes Aspen American Insurance Company Bond No. SU46311 effective March 28, 2016.

IDAHO DEPARTMENT OF LANDS

State of Idaho
DEPARTMENT OF LANDS

Surety Bond Number 1136357

Lease/Plan/Permit No(s). See Attached Exhibit "A"

KNOW ALL MEN BY THESE PRESENTS, That we AM Idaho LLC, as principal and Lexon Insurance Company, a corporation organized under the laws of the State of Texas, and having its principal place of business in the State of Kentucky, in the City of Louisville, as surety are held and firmly bound unto the State of Idaho, in the sum of One Hundred Thousand------ dollars ($ 100,000.00) lawful money of the United States, conditioned on the payment of all damages to the surface and improvements thereon of lands described in the above lease/plan/permit specified and any outstanding balances as set forth in the lease/plan/permit. For such payment, well and truly to be made, we bind ourselves, our and each of our heirs, executors, administrators, successors and assignees, as the case may be, jointly and severally, firmly by these presents.

THE CONDITION of the foregoing obligation is such that:

WHEREAS, by lease/plan/permit bearing the above serial number, the lessee/plan holder/permittee was granted specific rights under and pursuant to Idaho Code title 58, chapters 1,3 and 6 or Idaho Code title 47, chapters 7, 8, 13, 15 or 16, and the pertinent rules and regulations of the Idaho State Board of Land Commissioners; and

WHEREAS, said lessee/plan holder/permittee has, by virtue of the lease/plan/permit above referred to, entered into certain covenants and agreements set forth in such lease/plan/permit, under which operations are to be conducted; and

WHEREAS, the said principal, in consideration of being permitted, in lieu of the lessee/plan holder/permittee, to furnish this bond agrees and by these presents does hereby bond himself to fulfill on behalf of the lessee/plan holder/permittee all of the obligations of the said lease/plan/permit in the same manner and to the same extent as though he were the lessee/plan holder/permittee. It is understood and agreed by the surety and the principal that if there is outstanding restoration obligations on the premises, or if outstanding payments are due, this bond shall extend to cover all acts for which restoration is required or payment of such outstanding amounts due, both prior to and subsequent to the date of this bond, until notified in writing by the Idaho Department of Lands that such requirements have been met or the bond has been replaced. The Idaho Department of Lands may require payment of the entire sum of this bond, or portions thereof, upon written notice to the surety, by the department, of the lessee/plan holder/permittee's failure to perform any obligations and/or pay any amounts due under the above referenced statutes and pertinent rules.

The surety shall pay to the Department of Lands the sum of this bond, or portions thereof, as requested by the department within 30 days of receipt of such written notice. In the event of a partial distribution, the remaining funds and liabilities shall not be released until the department notifies the surety, in writing, of release of remaining liability or requires payment of the remaining bond liabilities. Payment of the full sum of the bond to the department shall release the surety of all liabilities and obligations.

NOW THEREFORE, if the above principal shall in good faith observe, carry out and comply with all the laws now existing or hereafter enacted, designed or intended for the protection of the surface owner of said lands against damage and resulting loss caused by any operations carried on under said lease/plan/permit, or if any such damage and resulting loss shall so occur nevertheless, for which damage and loss reimbursement is required and made, then this obligation shall become void, otherwise to remain in full force and effect; and the liability of the surety under this bond for any one or more defaults of the principal under said lease/plan/permit shall not exceed in the aggregate the sum stated herein above; It is further provided, however, that the bond may be cancelled by the surety by the service of written notice of cancellation upon the Director of the Department of Lands of the State of Idaho, such cancellation to be effective at the expiration of ninety (90) days after the service of such cancellation notice by the surety on the Director by registered mail. Such cancellation notice, however, shall not affect any liability that shall have accrued under this bond prior to the effective date of cancellation.

Signed on this 28th day of March, 2016

(Signature of Principal) Michael A. McCabe, CFO
15021 Katy Frwy, Suite 400, Houston, TX 77094
(Business Address)

(Signature of Surety) Teresa D. Kelly, Attorney-in-Fact
10002 Shelbyville Rd, Suite 100, Louisville, KY 40223
(Business Address)

ACKNOWLEDGEMENT OF SURETY

State of Texas)
) ss
County of Harris)

On this 28th day of March, in the year 2016, before me Candace D. Bosheers, a Notary Public in and for the State of Texas, personally appeared Teresa D. Kelly, known to me to be the attorney-in-fact of the corporation that executed the instrument, or the person who executed the instrument on behalf of said corporation, and acknowledged to me that such corporation executed the same.

In Witness Whereof, I have hereunto set my hand and affixed my official seal of day and year first above written.

Notary Public For Harris County, Texas
Residing at: 5444 Westheimer, Suite 900, Houston, TX 77056
My Commission expires January 24, 2020

POA #LX-264760

IDL 1801-29(26) 5-1-2002

ATTACHMENT S

S. **AQUIFER EXEMPTION FOR INJECTION ZONE** – See next three (3) pages for water analysis of the water produced from perforations at 5380 – 5390, which characterizes the water in the proposed injection zone. The depth of this zone, along with the presence of Benzene and other volatile organic compounds would limit or prevent the use of the water in this zone for aquifer uses.

Analytical Laboratories, Inc.
1804 N. 33rd Street
Boise, Idaho 83703
Phone (208) 342-5515

Attn: JEFF JANIK
ALTA MESA SERVICES, LP
15021 KATY FREEWAY STE 400
HOUSTON, TX 77094

Collected By: J JANIK
Submitted By: J JANIK

Perfs 5380 - 5390'

Source of Sample:
DJS PROP 2-14 PRODUCOD WATER

Time of Collection: 16:00
Date of Collection: 10/22/2014
Date Received: 10/23/2014
Report Date: 11/7/2014

Field Temp:
PWS:

Temp Rcvd in Lab: 20.4 °C
PWS Name

Laboratory Analysis Report

Sample Number: 1442245

NO FIELD TEMP GIVEN; NO TRAVEL BLANKS RCVD; Methane, Ethane, and Ethene testing were performed by Accutest Mountain States (AMS).

Test Requested	MCL	Analysis Result	Units	MDL	Method	Date Completed	Analyst
Aluminum, Al	UR	1.12	mg/L	0.10	EPA 200.7	10/24/2014	KC
Arsenic Low	0.01	< 0.005	mg/L	0.005	EPA 200.8	11/3/2014	JH
Barium, Ba	2	0.12	mg/L	0.05	EPA 200.7	10/24/2014	KC
Boron, B		7.40	mg/L	0.10	EPA 200.7	11/4/2014	KC
Calcium, Ca	UR	51.1	mg/L	0.50	EPA 200.7	10/28/2014	KC
Iron, Fe	UR	11.9	mg/L	0	EPA 200.7	10/29/2014	KC
Magnesium, Mg	UR	0.50	mg/L	0.50	EPA 200.7	10/28/2014	KC
Manganese Low		0.128	mg/L	0.005	EPA 200.7	10/24/2014	KC
Potassium, K	UR	56.7	mg/L	0.5	EPA 200.7	10/28/2014	KC
Selenium Low	0.05	< 0.005	mg/L	0.005	EPA 200.8	11/3/2014	JH
Silica	UR	106	mg/L	0.25	EPA 200.7	11/4/2014	KC
Sodium, Na	UR	392	mg/L	0.50	EPA 200.7	10/28/2014	KC
Uranium, U	30	< 5	ug/L	5	EPA 200.8	11/3/2014	JH
Metals Digestion		*			EPA 200.9-11	10/23/2014	JMS
Density		0.998	g/mL		Gravimetric	11/4/2014	JH
Nitrate (as N)		< 0.2	mg/L	0.2	EPA 300.0	10/23/2014	NC

MCL = Maximum Contamination Level
MDL = Method/Minimum Detection Limit
UR = Unregulated

Page 1 of 2   Date Report Printed: 11/7/2014 11:59:12

Laboratory Analysis Report

Sample Number: 1442245

NO FIELD TEMP GIVEN; NO TRAVEL BLANKS RCVD; Methane, Ethane, and Ethene testing were performed by Accutest Mountain States (AMS).

Test Requested	MCL	Analysis Result	Units	MDL	Method	Date Completed	Analyst
Benzene		1510	ug/L	0.5	EPA 8260B	10/28/2014	CY
Toluene		830	ug/L	0.5	EPA 8260B	10/28/2014	CY
Ethylbenzene		55.0	ug/L	0.5	EPA 8260B	10/28/2014	CY
Xylene, Total		390	ug/L	0.5	EPA 8260B	10/28/2014	CY
Methane		2.49	mg/L	0.0008	RSKSOP 175	10/27/2014	AMS
Ethane		0.399	mg/L	0.0016	RSKSOP 175	10/27/2014	AMS
Ethene		<0.0024	mg/L	0.0024	RSKSOP 175	10/27/2014	AMS
Alkalinity	UR	332	mg/L CaCO3		EPA 310.1	10/30/2014	CJS
Chloride, Cl	UR	305	mg/L	1	EPA 300.0	10/23/2014	NC
Fluoride, F	4.0	6.88	mg/L	0.10	EPA 300.0	10/23/2014	NC
Sulfate, SO4	UR	34	mg/L	1	EPA 300.0	10/23/2014	NC
pH	UR	8.8	S.U.		SM 4500-H B	10/23/2014	RME
Conductivity	UR	1,880	umhos	2	SM 2510B	10/23/2014	RME
Bicarbonate		302	mg/L		SM 2320	10/30/2014	CJS
Carbonate		29.8	mg/L		SM 2320	10/30/2014	CJS
Hydroxide		0.0	mg/L		SM 2320	10/30/2014	CJS
Resistivity		5.32	ohm*cm			10/23/2014	DS
Total Dissolved Solids	UR	1,540	mg/L	25	SM 2540C	10/28/2014	GM

MCL = Maximum Contamination Level
MDL = Method/Minimum Detection Limit
UR = Unregulated

Thank you for choosing Analytical Laboratories for your testing needs.
If you have any questions concerning this report,
please contact your client manager: James Hibbs

Page 2 of 2

Date Report Printed: 11/7/2014 11:59:12

Analytical Laboratories, Inc.
1804 N. 33rd Street
Boise, Idaho 83703
Phone (208) 342-5515

Date Report Printed: 11/21/2014 3:49:55 PM
http://www.analyticallaboratories.com
These test results relate only to the items tested.

Laboratory Analysis Report

Sample Number: 1442246

Attn: JEFF JANIK
ALTA MESA SERVICES, LP
15021 KATY FREEWAY STE 400
HOUSTON, TX 77094

Collected By: J JANIK
Submitted By: J JANIK

Source of Sample:
DJS PROP 2-14 PRODUCOD WATER

Time of Collection: 16:00
Date of Collection: 10/22/2014
Date Received: 10/23/2014
Report Date: 11/21/2014

PWS#:
PWS Name:

Field Temp: Temp Rcvd in Lab: 20.4 °C

NO FIELD TEMP GIVEN; Radiological testing was performed by Summit Environmental (SUM).

Test Requested	MCL	Analysis Result	Units	MDL	Method	Date Completed	Analyst
Gross Alpha	15 pCi	<3	pCi/L	3	EPA 900.0	11/11/2014	SUM
Gross Beta		57+/-5.8	pCi/L	4	EPA 900.0	11/11/2014	SUM

MCL – Maximum Contamination Level
MDL – Method/Minimum Detection Limit
UR = Unregulated

Page 1 of 1

Thank you for choosing Analytical Laboratories for your testing needs.
If you have any questions about this report, or any future analytical needs, please contact your client manager:
James Hibbs

ATTACHMENT U

U. **DESCRIPTION OF BUSINESS** - AM Idaho LLC is the operating subsidiary of High Mesa Holdings, LP. High Mesa Holdings, LP is a privately-held, independent exploration and production company, primarily engaged in the acquisition, exploration, development and production of oil, natural gas and natural gas liquids within the United States.

Deep Aquifer Utilization Costs

r

Construction Costs:			
Item #	**Description**	**$**	Basis, source
1	Drill and Case Well	$ 2,300,000	Recent well cost, includes location and short road
2	Complete with electrical submiersible pump	$ 200,000	Estimate based on current market costs
3	Install Electrical Service	$ 1,380,000	From evaporation pond estimate for 480 V for Big Willow x 3 - much more power required
4	Install Flowline	$ 2,500,000	Assume 5 miles at $500k/mile with heat traced insulated risers
5	Purchase Treating Facilities	$ 4,071,000	From Global Advantech Proposal for 60 bbl/hr - electocoagulation, activated carbon absorption, ultrafiltratioin, trickle filtration
6	Purchase and Install Tanks and Piping	$ 200,000	4 x 400 bbl, insulated, heat traced, piping insulated and heat traced
7	Install Treating Facilities	$ 180,000	Roustabout crew, welders, crane, electricians - Assume 6000/day * 30 days
8	Transfer Pump and controls	$ 110,000	from P. Negron estimate for transfer pump
9	Heat tracing	$ 50,000	Estimate
10	SCADA / Controls	$ 100,000	Estimate based on Little Willow
11	Construction Supervision	$ 90,000	30 days @ 3000
12	Commissioning	$ 155,000	Site supervision, electricians, mechanic, water disposal, water transport, hydrotesting - assume 2 weeks at 7500/day + 5 days @ 10000
	TOTAL	**$ 11,336,000**	

Facility and Well Operating Costs - monthly:			
13	Operators	$ 15,000	Assume 3 operators, operating days only
14	Electrocoaggulation electrodes	$ 500	replace every several months
15	Coagulant chemical	$ 1,260	1$/1000 gallons
16	High and low pH cleaners	$ 1,000	100 gal/month (10$/gallon
17	Sodium hypochlorite for filter disinfection	$ 50	10 gallons / month
18	Seals, valve seats, filter media,	$ 5,000	5000/month
19	Filter media and filtered and precipitated material disposal	$ 2,000	2000/month
20	Electrical Power	$ 27,000	$0.10/kWH, 500 HP
21	Instrument Technician	$ 5,000	Contract as needed
22	Mechanics	$ 5,000	Contract as needed
23	Quality control monitoring	$ 2,000	Fluid analysis and testing by 3rd party
24	Regulatory compliance	$ 3,000	Consultant / reporting / inspections / training
	TOTAL	**$ 66,810**	**$/month**

Averaged Well Workover / Maintenance Cost - monthly			
Potential for sanding or scaling up and requiring gravel pack and /or acidizing.			
	Miscellaneous workover to replace pump / acidze / replace tubing / gravel pack, etc	$ 3,125	150000 every 4 years
	TOTAL	**$ 3,125**	**$/month**

Notes:

Process for and cost of treating water from deep aquifer:

Assume 1000 Barrels of water per day

Assume Groundwater Criteria

Life of well dependent on aquifer size and boundaries and integrity of formation and tubulars.

PROPOSAL TO ALTA MESA, USA

FOR

PACKAGED PRODUCED WATER TREATMENT SYSTEMS

Ref: GAR00768/P01/02
Date: 05/06/2017

Prepared by: Michael Levey
Global Advantech Resources Limited
Westpoint House, Prospect Park
Prospect Road, Arnhall Business Park
Westhill, AB32 6FJ
United Kingdom
Tel: +44 (0)845 519 0765

CONTENTS

CONFIDENTIALITY

This document has been prepared is submitted in confidence to Alta Mesa.

REVISION HISTORY

GAR00768/P01/02 Original proposal

1 EXECUTIVE SUMMARY

1.1 Overview

This revised proposal is presented by Global Advantech Resources Limited to Alta Mesa for the supply of packaged, integrated, automated produced water treatment systems, capable of being trailer mounted. The systems are modular and designed so that the system treatment capacity may be increased (scaled-up) by the addition of further modules in the future.

1.2 Treatment technologies selected

The technologies utilized in the produced water treatment systems have been selected to ensure effective operation, while minimizing construction and operating costs. These are:

- Electrocoagulation – highly effective for the removal of dispersed/emulsified hydrocarbons, organic and inorganic suspended solids, biological material (bacteria, larvae, algae, etc.), dissolved heavy metals and alkaline earths from water. Electrocoagulation using aluminum electrodes has been selected as the most efficient way to rapidly remove the dissolved zinc and other heavy metals from solution.
- Activated carbon absorption – to absorb remaining dissolved organic compounds, e.g. surfactants, oils and hydrocarbons.
- Ultrafiltration (the ultra filters are protected by micro filters) - to remove remaining ultrafine particulates (>0.05microns) and bacteria.
- Optional air stripping of any remaining volatile hydrocarbons.

1.3 Produced water treatment

Alta Mesa has requested a proposal for systems to treat produced water with analyses similar to those given in documents supplied together by Alta Mesa (references: 20160523 Composite Produced Water Little Willow - Idaho Analysis; 170315039_HDEC, March 2017 results; and Petroleum Hydrocarbon Testing Results) to remove the following:

- Heavy metals >95%
- Alkaline earths >95%
- Radionuclides (strontium, radium, uranium) >95%
- Oils and hydrocarbons >99%
- Suspended organic and inorganic solids >99.9%

So that it is compliant with Idaho Department of Environmental Quality Codes for reuse. The reuse application, e.g. crop irrigation, dust control, etc.; will depend upon the concentrations of monovalent salts, e.g. sodium chloride, in the produced water being treated from a particular well. If required, an additional option process module, containing a high pressure reverse osmosis system to remove these monovalent salts, may be installed (note: a high pressure reverse osmosis would produce a concentrated reject stream containing these salts, which would need disposal.)

1.3.1 Main features of the proposed produced water treatment systems

The main features of Global Advantech Resources' packaged produced water treatment systems are:

i) The produced water treatment system comprised of one or more identical water treatment subsystems (for this application, each water treatment subsystem is configured to treat 30bbl/hour of produced water flow) and is controlled by its own distributed PLCs.

ii) The produced water treatment system is built into two self-bundled, 40 feet ISO containers to permit ease of transportation and shipping and they may be mounted/operated on trailers for mobile operation.

iii) The modular design facilitates shipping and very rapid installation on site. Once located on site, the modules are installed by linking together the supplied hard wall flexible pipework and electrical/ hardened Ethernet wiring harnesses, and connecting the external electrical services and produced water inlet/treated water discharge pipework.

iv) The produced water treatment capacity installed on site is readily increased or decreased to meet production requirements.

v) When there is more than one treatment subsystem installed on site, the treatment subsystems may be configured so that if one subsystem is taken offline, e.g. for maintenance, then the remaining operational subsystem(s) automatically continue to treat the produced water flow. Two identical produced water treatment systems may be interconnected for full duty-standby operation, where both systems automatically cycle between operating and hot-standby and their master PLC control systems monitor each other and will take over automatically in the event that one system fails.

Installation of system at Hides, Papua New Guinea

Drilling slops and wastewater treatment system

System internals

Containerised system used to treat waste water and produced water from rainforest oil and gas drilling operations in the Southern Highlands of Papua New Guinea

2 TREATMENT TECHNOLOGIES

2.1 Process technology selection

Several technologies are incorporated to ensure that the packaged system is able to treat produced waters with varying analyses without requiring operator intervention:

- Electrocoagulation
- Dissolved air flotation/sedimentation
- Multimedia and activated carbon filtration
- Micro and ultrafiltration
- Optionally, air stripping with carbon capture to remove any residual volatile hydrocarbons

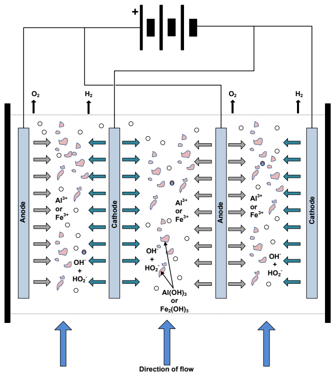
2.1.1 Electrocoagulation

Electrocoagulation is a continuous flow, low energy consumption, electrochemical process for the treatment of wastewater, and effluent arising from many sources, whether for discharge to the environment or for re-use/recycling within industrial processes. It is a highly cost effective and efficient process to treat and remove many contaminants/pollutants from water, including:

- Fats, oils and greases
- Organic and inorganic suspended solids
- Proteins, starches and other organic polymers
- Emulsified/dispersed oils and hydrocarbons
- Biological material, e.g. bacteria, algae, and larvae
- Alkaline earth metals such as calcium, which causes water hardness
- Heavy/toxic metals, e.g. copper, chromium, etc.
- Radionuclides, e.g. strontium, radium, uranium, lead, etc.

2.1.1.1 Electrocoagulation process

Electrocoagulation cells consist of a number of pairs of parallel metal plate electrodes separated by a few millimeters with a low voltage applied at high current densities. The current flowing between the electrodes destabilizes the electrical charges within the fluid, and maintains the particles in suspension, e.g. clays, and emulsions/micro-emulsions of hydrocarbons and insoluble organic compounds. The particulates then coagulate together into flocs. The hydrocarbons and insoluble organic compounds coalesce into larger droplets and rise in the cells. Electrochemical reactions at the electrodes produce very fine H_2 and O_2 gas bubbles and highly chemically reactive hydroxyl OH^- and superoxide HO_2^- radicals. The gas bubbles promote the flotation of coagulated solids and coalesced hydrocarbons, etc. The hydroxyl and superoxide radicals cause the precipitation of hydroxides of heavy metals and the breakdown of many soluble organic molecules.



i) **Most efficient solution.** Electrocoagulation using aluminum electrodes has been selected as the most efficient way to rapidly remove the dissolved zinc and other heavy metals from solution. Removal of zinc and other heavy metals is typically >95% using one stage of electrocoagulation with aluminum electrodes and >98% using two stages of electrocoagulation.

ii) **Additional advantages.** Electrocoagulation offers a distinct advantage, since in addition to the removal of zinc and other heavy metals; electrocoagulation will remove the majority of dispersed/emulsified oil and hydrocarbons, suspended organic matter and particulates, larger organic molecules and polymers, biological material (algae, bacteria, larvae, etc.) and alkaline earth metals.

iii) **Lower OPEX than other standard methods.** The electrocoagulation systems offer lower operating costs (OPEX) than multi-effect evaporation or mechanical vapor recompression units for the removal of concentrations of dissolved heavy salts from water.

2.1.1.2 Electrocoagulation process performance

Electrocoagulation processes are able to remove (and recover) many contaminants from waste and polluted water streams including:

	One pass	Two passes
Suspended solids	>95%	>99%
Emulsified/dispersed hydrocarbons	>95%	>99%
Bacteria/algae/larvae	>95%	>99%
Heavy metals	>95%	>99%
Calcium, magnesium	>90%	>95%
Arsenic	>90%	>95%
Biological oxygen demand	>90%	>95%
Chemical oxygen demand	>90%	>95%

2.1.1.3 Electrocoagulation system features and benefits

The proprietary electrocoagulation system design includes a number of unique and innovative design features to ensure effective and continuous operation:

i) The cells use optimized low voltage, high current electrochemistry, with a large number of parallel plate electrodes for efficient operation.

ii) The profile of the electric current applied to the electrodes is optimized to prevent metal electrode passivation (development of an oxide layer, which acts as an insulator preventing cells from continuing to operate) and monitors electrode plate wear.

iii) Large electrode contact area within electrocoagulation cells for efficient operation.

iv) The cells have an optimized water flow hydrodynamics to ensure that the electrodes are evenly consumed and that produced flocs are swept out of the cells

v) The cells incorporate an automated backwash facility to minimize maintenance.

vi) The cells use upward flow to sweep out all hydrogen and oxygen bubbles produced during the process to flotation/sedimentation tanks and to prevent sediment build-up in the cells.

vii) All systems utilize multiple PLCs, which are programmed to control the electrocoagulation cell power supplies so that the systems are able to run in full automatic mode.

viii) Systems automatically integrate currents applied to the electrodes against time applied to calculate the wear on the cell electrodes and alarm when the electrodes are due for replacement.

ix) Scalable treatment capacity throughput through connecting cells in parallel.

x) The electrodes are mounted in carrier cartridges enabling rapid replacement.

xi) Multi-cell configurations enable a single cell to be taken off-line for maintenance.

xii) All cells are mounted with interlocks to prevent access during operating.

xiii) Minimization of the production of waste by-products – 80% less hydrated floc volumes compared to chemical treatment.

2.1.2 Dissolved air flotation/sedimentation

The electrocoagulation cells discharge into a dissolved air flotation/sedimentation tank, which has an automatic floc scraper and floc/sediment discharge pump, to remove all of the coagulated particulates and compounds precipitated out from solution (heavy metals, alkaline earths, etc.).

2.1.3 Multimedia filtration

A 5 microns multimedia filter is installed after the dissolved air flotation/sedimentation tank to protect the following process stage from any flocs/sediments that might overflow.

2.1.4 Activated carbon

Activated carbon filters contain constrained activated carbon granules and have high absorption capacity for the removal of many organic compounds, including surfactants, biological compounds, polymers, etc., from water pumped through them. Activated carbon filtration is included to absorb the majority of hydrocarbons that might remain in the water after the electrocoagulation process and to further reduce to the concentrations of molecules giving rise to BOD (biological oxygen demand) that have not been completely removed in the preceding treatment stages.

2.1.5 Microfiltration and ultrafiltration

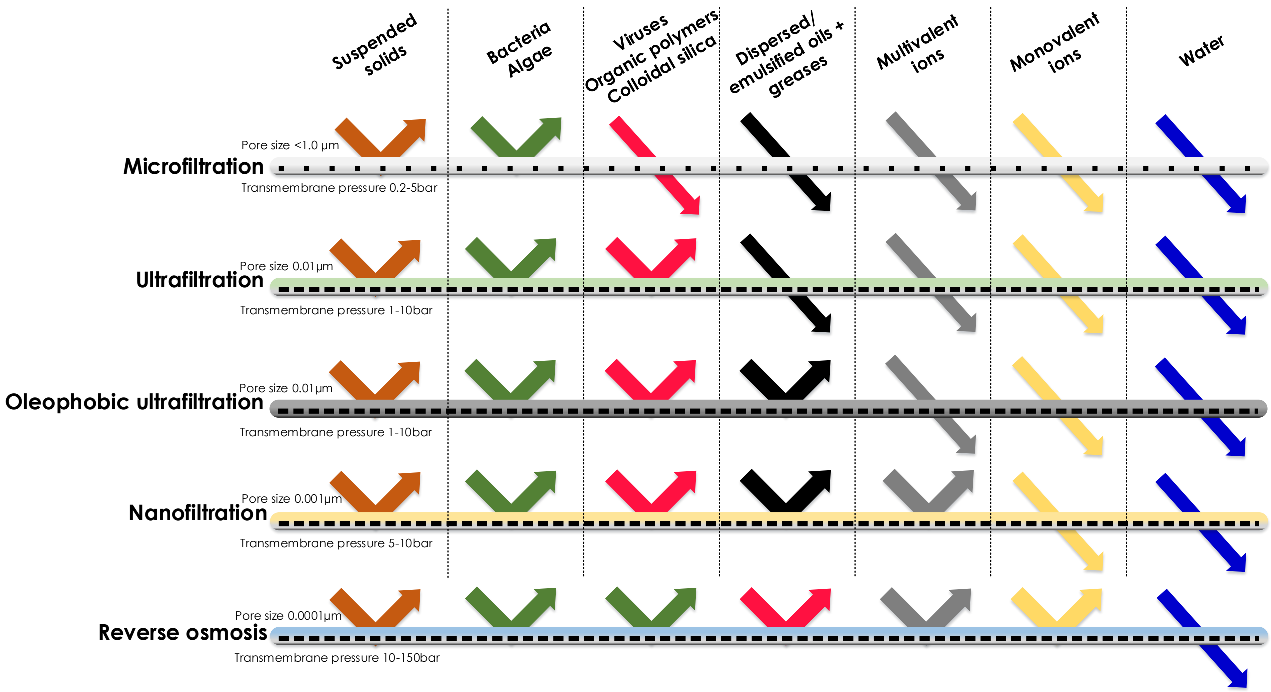
2.1.5.1 Membrane selection

Two stages of membrane filter are installed in series:

i) Microfiltration membranes to remove particulates above 1.0 microns in size, are used to remove the larger suspended particulates that may be present in the produced water to the protect oleophobic ultrafiltration membranes

ii) Highly oleophobic ultrafiltration membranes to remove the dispersed/emulsified crude oil hydrocarbons present in the produced water. These membranes are made from membranes are manufactured from a polyacrylonitrile polymer and have been engineered to extremely hydrophilic/oleophobic so that they are not fouled by oils and greases (conventional membranes are manufactured from materials that oleophilic). These ultrafiltration membranes have pore sizes of typically 0.02 µm (micron), which prevent particulates and any residual dispersed/emulsified oil and grease droplets from passing through and are rejected.

The membrane filters are made from bundles of hollow membrane fibers spirally wound with support structures and welded into carrier housings to form membrane cartridges. The different types of polymeric filter membrane, their filtration characteristics and operating pressure ranges are summarized in the following diagram.



(It should be noted that ultrafiltration, Nano filtration and reverse osmosis reject part of the water stream being treated, which requires to be re-circulated for additional treatment.)

2.1.6 Air stripping with carbon capture

Optionally, an air stripping column with activated carbon capture of volatile hydrocarbons may be added to the packaged system, to ensure that all volatile hydrocarbons: benzene, toluene, etc., are removed from the water prior to discharge from the packaged treatment system.

3 PRODUCED WATER TREATMENT SYSTEM DESIGN

3.1 System design overview

The packaged produced water treatment system is built as two modules, comprising of 2 40 feet by 8 feet ISO-sized containers to facilitate mounting on standard 40 feet trailers for ease of mobility and system transportation, handling and rapid installation on site. The modules are designed so that they may be operated whilst on the trailers of or stacked two high to minimize the system footprint on site.

3.2 30bbl/hour produced water treatment system components

i) Two 40 feet ISO-sized containers with integral bunds.

ii) System buffer tank with pH monitoring and chemical dosing for pH control.

iii) Five in total through flow electrocoagulation cells, each one fitted with aluminum electrodes and connected in parallel (the electrodes in each electrocoagulation cell are fitted into removable cartridges to facilitate rapid change of electrodes). (

iv) Inline mixer for the addition of coagulant to accelerate the coagulation of any suspensions of heavy metal hydroxides, alkaline earth hydroxides/insoluble salts, dispersed/emulsified oils/hydrocarbons, organic particulates and matter, etc., removed from solution by the electrocoagulation process.

v) Dissolved air flotation/sedimentation tank to remove coagulated suspensions and precipitated sediments arising from the electrocoagulation process, with white water recirculation pumps, automated scrapers and automated floc/sediment dump valves.

vi) Buffer tank to balance the flow of the water being treated between the electrocoagulation stage and the filtration stage.

vii) Pumps.

viii) Multimedia filter.

ix) Activated carbon filter.

x) Micro filters and oleophobic ultra filters to remove any remaining ultrafine, neutrally buoyant particulates, oil/hydrocarbon droplets to >0.02 microns in size.

xi) Automated filter backwash system to maintain performance of the multimedia, micro and ultra filters.

xii) Instrumentation including conductivity sensors, flow and level sensors, pressure sensors on the electrocoagulation cells, etc.

xiii) Distributed PLC network connected via hardened Ethernet to master PLC and color HMI.

xiv) Electrocoagulation cell power-supply subsystems.

xv) Filter press and screw conveyor for discharge.

xvi) Valves and pipework.

xvii) Electrical services.

xviii) Standard documentation and drawings pack.

3.3 Materials used for construction of treatment systems

The components and materials selected for the fabrication and construction of the packaged produced water treatment systems have been chosen for their resistance to corrosion and longevity.

i) The modules (frames and containers) are steel, coated with an epoxy paint system for corrosion protection in a marine environment.

ii) Tanks internal to the packaged systems, including process buffer tanks and dissolved air flotation/sedimentation tanks are fabricated from polymer composites, as are the multimedia and carbon filter, micro and ultra filter, and electrocoagulation cell housings.

iii) All pipework and valves internal to the modules are made from corrosion resistant post-chlorinated PVC (cPVC) and are physically protected against mechanical knocks and abrasions.

iv) The initial system feed tank is fabricated from glass-lined carbon steel.

v) All external water treatment module interconnection pipework is made using reinforced, flexible hard wall rubber, as appropriate to the design.

3.4 Operation of produced water treatment system

i) Produced water is pumped into the initial system buffer tank, where its pH is adjusted.

ii) The water is then pumped through the parallel array of electrocoagulation cells.

iii) Coagulant is mixed into the water exiting each set of electrocoagulation cells, prior to entering the dissolved air flotation/sedimentation tank (DAF tanks) (one in each subsystem) to accelerate the rate of removal heavy metal hydroxides, oils, hydrocarbons, suspended/organic matter, alkaline earth metals, etc., separated/precipitated out from solution by the electrocoagulation process.

iv) The separated/precipitated material collects as flocs and sediments in the DAF, which are automatically periodically pumped to the filter press, where they are dewatered and discharged via a screw conveyor into skips for disposal in accordance with state regulations.

v) The water being treated overflows from the DAF tank and into the process buffer tank.

vi) From the buffer tank, the water is pumped via the multimedia and granulated activated carbon filter, then through the micro and ultra filters before being discharged from the system via the activated carbon filters – the multimedia filters, micro and ultra filters are automatically periodically backwashed and the backwash solutions are pumped to the filter press.

vii) The filtrate liquid from the filter press is returned to the main system buffer/balancing tank for further treatment.

viii) Optionally, an air-stripping column may be installed prior to discharge from the system to ensure that any volatile hydrocarbon residuals are removed from the water.

3.5 Operational procedures

The packaged treatment system is fully automated under PLC control, with sensors to give the necessary feedback to the master PLC control programs, e.g. pressure, flow, conductivity, position of valve, etc. The initial process set points for the operation, e.g. differential pressures to automatically trigger backwashing of the multimedia, micro and ultra filters, are entered into the control processor via the HMI during the operational testing and commissioning stages. These points may be adjusted later based upon experience, to minimize operational maintenance requirements. Once all the chemical reservoirs are fully replenished, etc., the packaged treatment system is started up and operates automatically, only requiring monitoring/response to alarm conditions, in addition to normal operating maintenance.

Whilst the packaged treatment system is fully automated, it is recommended that one operator is available at all times to ensure that all chemical reservoirs are replenished when the systems flag warn that levels are low and run the scheduled cleaning procedures, etc.

3.6 Normal operational maintenance

The packaged treatment system has been designed so that there will be no requirement for external specialist technicians/experts for the normal maintenance of the packaged treatment system. Normal operational maintenance procedures are to be carried out by Alta Mesa's trained operators/engineers.

3.7 Requirements on site

Electricity requirement for the treatment system is 380-415VAC, 50—60Hz and will have a peak load of approximately 50KW.

3.8 Consumables

i) Aluminum electrode plate sets for the electrocoagulation cells (estimate replacement approximately every 8-16 weeks) – the electrode wear is automatically monitored and an alarm is flagged when the electrodes in each electrocoagulation subsystem require examination and replacement.

ii) Coagulant to aid flocculation of charge neutral, neutrally buoyant ultrafine particulates after electrocoagulation and sodium hydroxide solution for pH control.

iii) High and low pH cleaners for the micro and ultra filters.

iv) Sodium hypochlorite or sodium metabisulphite solution for periodic disinfection of micro and ultra filter membranes.

3.9 Facility for remote diagnostics/program updating

An optional interface can be installed into the master PLC, which would offer a number of important benefits:

i) It would enable remote diagnostics to be carried out prior to an engineer visiting site or instructions issued to an operator on how to correct an issue with a system.

ii) Required program updates may be installed without the necessity of an engineer-visiting site.

3.10 Future expansion

The packaged produced water treatment system is modular and may be expanded by the addition of further 30bbl/hour capacity treatment modules to meet the future requirements of Alta Mesa.

The system includes a master PLC with HMI for automation, monitoring and control, and a number of slave PLC's to control the individual system process, which are connected to the master PLC via hardened Ethernet and ensure that system cabling is kept to a minimum. This design permits flexibility in operation and will enable further produced water treatment modules to be connected up and controlled by the master PLC.

4 COMMERCIAL OFFER

4.1 Financial detail

	Description	Item Price
1	30bbl/hour produced water treatment system, comprising: • 2 number ISO (40 feet by 8 feet) epoxy painted containers/frames, with integral bunds (modules). • System buffer tank with pH monitoring and chemical dosing for pH control. • Five in total through flow electrocoagulation cells, each one fitted with aluminum electrodes and connected in parallel (the electrodes in each electrocoagulation cell are fitted into removable cartridges to facilitate rapid change of electrodes). (• Inline mixer for the addition of coagulant to accelerate the coagulation of any suspensions of heavy metal hydroxides, alkaline earth hydroxides/insoluble salts, dispersed/emulsified oils/hydrocarbons, organic particulates and matter, etc., removed from solution by the electrocoagulation process. • Dissolved air flotation/sedimentation tank to remove coagulated suspensions and precipitated sediments arising from the electrocoagulation process, with white water recirculation pumps, automated scrapers and automated floc/sediment dump valves. • Buffer tank to balance the flow of the water being treated between the electrocoagulation stage and the filtration stage. • Pumps. • Multimedia filter. • Activated carbon filter. • Micro filters and oleophobic ultra filters to remove any remaining ultrafine, neutrally buoyant particulates, oil/hydrocarbon droplets to >0.02 microns in size. • Automated filter backwash system to maintain performance of the multimedia, micro and ultra filters. • Instrumentation including conductivity sensors, flow and level sensors, pressure sensors on the electrocoagulation cells, etc. • Distributed PLC network connected via hardened Ethernet to master PLC and color HMI. • Electrocoagulation cell power supply subsystems. • Filter press and screw conveyor for discharge. • Valves and pipework. • Electrical services. • Standard documentation and drawings pack.	**For operation in the presence of flammable vapors ATEX Zone 2/ ExD USD 3,203,000**

	Description	Pricing
2	Air stripping column with blowers and carbon vapor capture	**USD 122,000**
3	Engineers for HAZOP/HAZID and design review meetings, installation, commissioning, training, call out, etc., per day man day from date of departure to site to date of return to UK base, plus direct expenses at cost plus 15%	**USD 900 per man per day**
4	Annual spares holding	**TBA Subject to agreement with Alta Mesa**
5	Maintenance support contract – excludes engineers' time and engineers' direct expenses and replacement components outside manufacturers' warranties (all warranties are on a return to manufacturer basis and exclude freight/immediate replacement costs.). Levels of support and engineer availability service levels to be agreed	**TBA Subject to agreement with Alta Mesa**
6	Remote diagnostic facility to support maintenance	**USD 16,940**

4.2 Other terms and conditions

i) All prices shown in United States Dollars (USD).

ii) Above prices exclude UK VAT (not applicable for exported systems) and shipping, delivery to site, site preparation, lifting, connection of electrical and other site services to the system and any Customs taxes, import duties and other applicable local taxes.

iii) Payment terms to be agreed.

Proposed	
15%	On Contract acceptance
15 %	Completion of Design/Drawings
30 %	Procurement of Long Lead items
30 %	System completion ready for Delivery
10 %	Collection for Shipment

iv) Proposed system is designed and built in accordance with sound engineering practice, as an option other standards can be used if required.

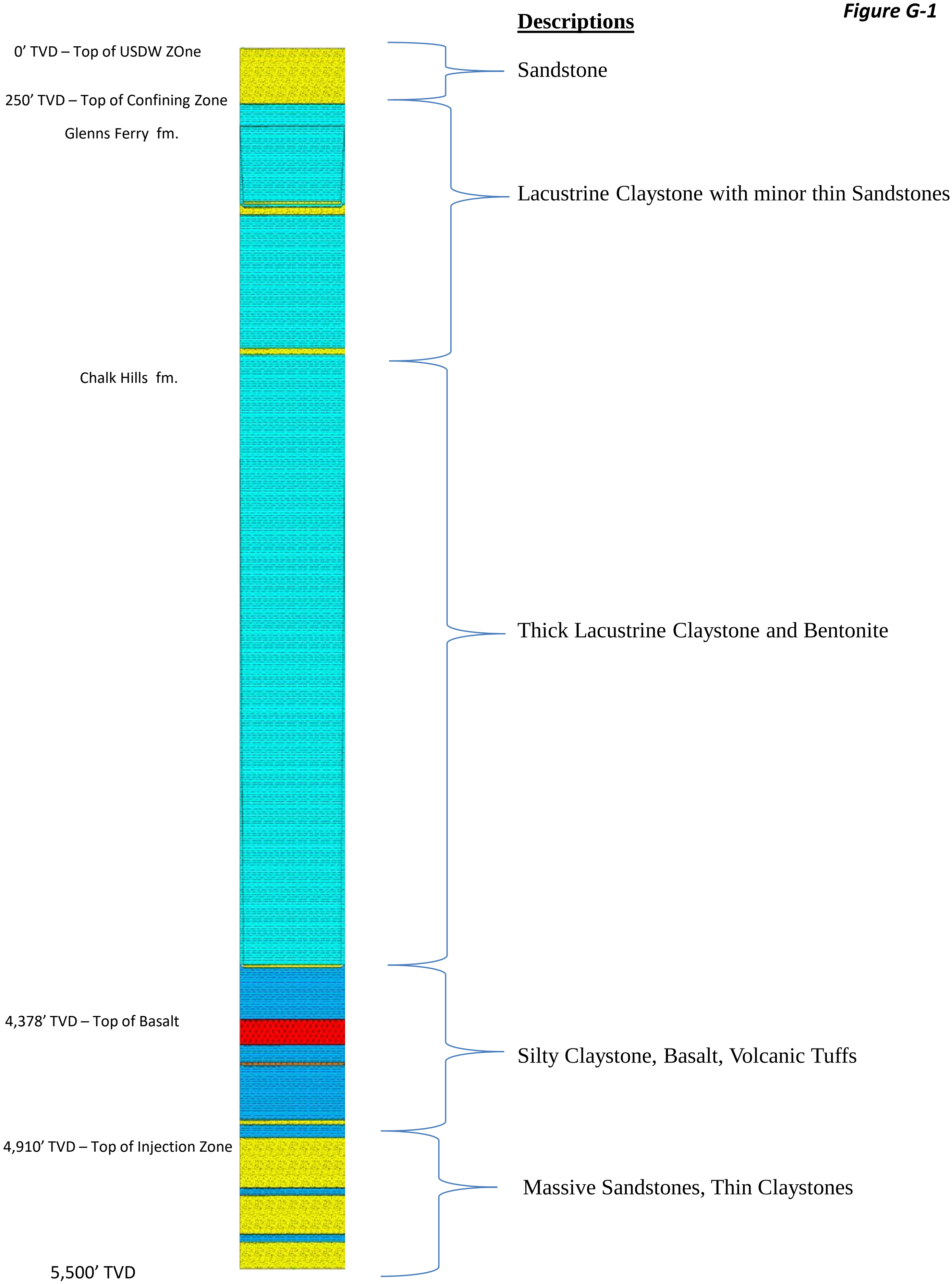
v) Documentation and drawings are in accordance with Global Advantech Resources Limited's usual practice, as options additional documentation and drawings can be prepared and to different standards if required.

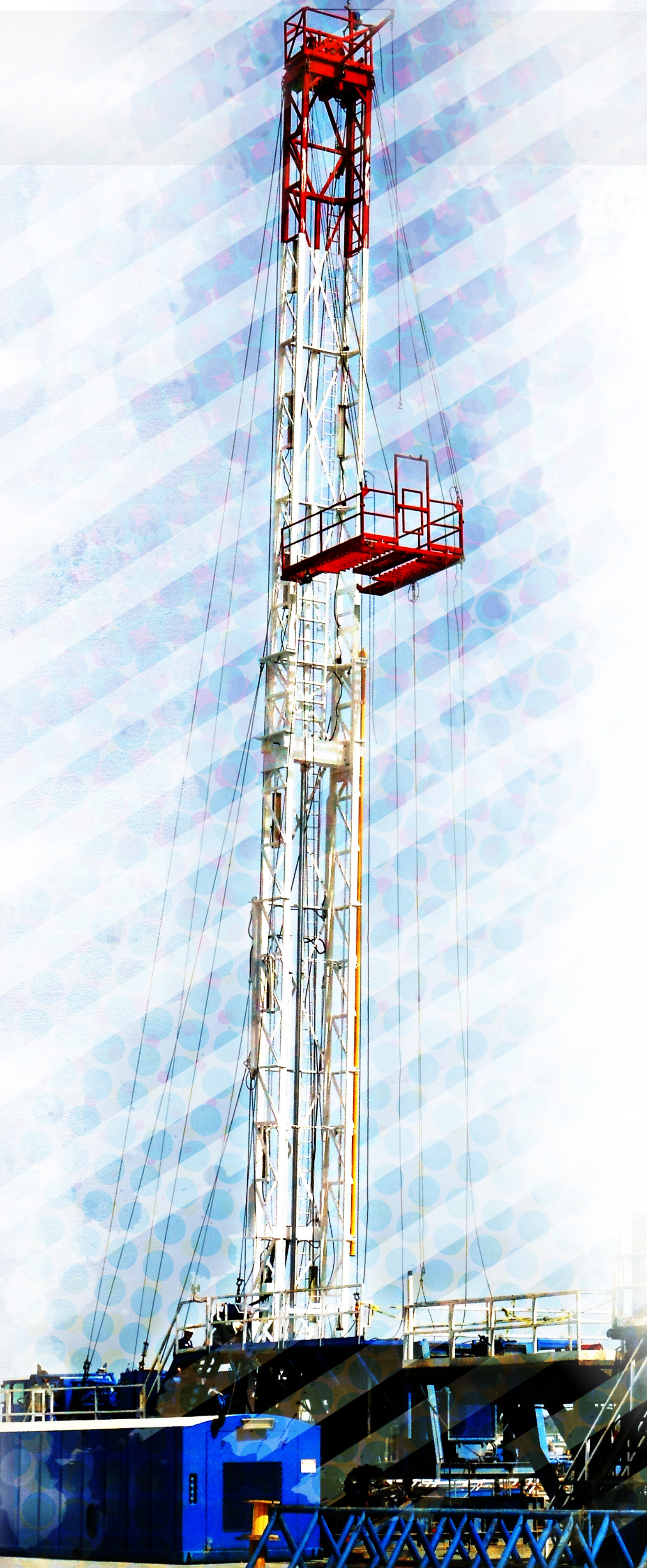
vi) Ready to ship, 18-24 weeks after confirmation of order.

vii) Rental Options may be available as an alternative to purchase for the supply the produced water treatment systems and ancillary plant with a minimum rental period of 2 years.

DJS 2-14 Composite Lithological Section

Figure G-1





RIG 7

RIG

Our Rig 7 is a self-propelled, hydraulically raised and scoped double with a depth rating of 8,500’. This Rig is a very fast mover and has an extremely small and flexible footprint.

DRAWWORKS

Cooper LTO-550 double drum hoist powered by one Detroit Diesel Series 60, electronically controlled engine with Allison 6-speed Automatic Transmission.

DERRICK

SKM 104’, 260,000 lb. telescoping derrick.

SUBBASE

PGDS Self Contained, Box Type Sub Base. The floor measures 20’ X 16’ X 13’ high. This unit includes a 50’ racking platform and houses the rotary drive system.

ROTARY DRIVE SYSTEM

National 17 1/2” rotary table powered by Detroit Diesel Series 50 electronically controlled diesel engine with Allison HT-740 automatic transmission.

TRAVELING EQUIPMENT

- McKissick model FIG-663, 150 ton traveling block hook combination with four 1" sheaves.
- Oilwell PC-150 swivel.
- 4 1/4" x 41' square kelly.
- Baash Ross 1RHS4 square drive kelly bushings

HANDLING EQUIPMENT

PGDS HydraCat system for makeup and breakout. Air spinning chain. Pullmaster M8, 8000 lb. hydraulic winch for the main line. Pullmaster M8, 8000 lb. hydraulic winch for the high line.

MUD PUMPS

Pumps 1 and 2 are identical. They are Mud King MZ-9 triplex pump powered by (1) MTU 12V-2000, electronically controlled engines. Pump is complete with a 20 gallon pulsation dampener and 5 x 6 charging pumps. All piping and valves are 4" 5000 lb. test pressure. Pumps come standard with 6" liners. Other liner sizes are available upon request.

MUD SYSTEM

Two tank in line configuration with an active capacity of 320 bbls. Equipped with (2) PGDS model 357 linear shale shakers, Halco 6" High Shear mud hopper, (2) electric driven 5 x 6 centrifugal pumps powered by Toshiba 40 hp electric motors, (4) 5 hp mechanical agitators, mud dock, and pill pit.

GENERATORS

(2) 280 KW Stewart & Stevenson Generators powered by Series 60 electronically tcontrolled engines mounted in an enclosed 40' x 8' x 8' high house with Square "D" switchgear and Dresser Air Compressors.

STORAGE TANK:

Water tank is 40 ft. by 8 ft. wide and 8 ft. high with a 450-barrel capacity. Water is supplied by (2) 1 ½" x 2" centrifugal pumps. Integrally mounted is a 650 gallon closed circuit cooling system with (2) 1 ½" x 2" centrifugal pumps for brake water filtering and cooling

Fuel storage tank is 5000 gallon capacity with an environmentally safe lube rack including four 105 gal oil tanks, one 225 gal waste oil tank, and one spill prevention materials cabinet.

Secondary and tertiary containment is available upon request.

HOUSES

Doghouse is 40' x 8' x 8' high with lockers, drinking water, first aid station, Tool Pusher Office and Parts Room.

MISCELLANEOUS:

Five Star electric over hydraulic survey unit with 22000 feet of .092" slick line.

Analytical Laboratories, Inc.

1804 N. 33rd Street
Boise, Idaho 83703
Phone (208) 342-5515

Attn: JEFF JANIK
ALTA MESA SERVICES, LP
15021 KATY FREEWAY STE 400
HOUSTON, TX 77094

Collected By: J JANIK
Submitted By: J JANIK

Perfs 5380 - 5390'

Source of Sample:
DJS PROP 2-14 PRODUCOD WATER

Time of Collection: 16:00
Date of Collection: 10/22/2014
Date Received: 10/23/2014
Report Date: 11/7/2014

Field Temp:
Temp Rcvd in Lab: 20.4 °C
PWS:
PWS Name

Laboratory Analysis Report

Sample Number: 1442245

NO FIELD TEMP GIVEN; NO TRAVEL BLANKS RCVD; Methane, Ethane, and Ethene testing were performed by Accutest Mountain States (AMS).

Test Requested	MCL	Analysis Result	Units	MDL	Method	Date Completed	Analyst
Aluminum, Al	UR	1.12	mg/L	0.10	EPA 200.7	10/24/2014	KC
Arsenic Low	0.01	< 0.005	mg/L	0.005	EPA 200.8	11/3/2014	JH
Barium, Ba	2	0.12	mg/L	0.05	EPA 200.7	10/24/2014	KC
Boron, B		7.40	mg/L	0.10	EPA 200.7	11/4/2014	KC
Calcium, Ca	UR	51.1	mg/L	0.50	EPA 200.7	10/28/2014	KC
Iron, Fe	UR	11.9	mg/L	0	EPA 200.7	10/29/2014	KC
Magnesium, Mg	UR	0.50	mg/L	0.50	EPA 200.7	10/28/2014	KC
Manganese Low		0.128	mg/L	0.005	EPA 200.7	10/24/2014	KC
Potassium, K	UR	56.7	mg/L	0.5	EPA 200.7	10/28/2014	KC
Selenium Low	0.05	< 0.005	mg/L	0.005	EPA 200.8	11/3/2014	JH
Silica	UR	106	mg/L	0.25	EPA 200.7	11/4/2014	KC
Sodium, Na	UR	392	mg/L	0.50	EPA 200.7	10/28/2014	KC
Uranium, U	30	< 5	ug/L	5	EPA 200.8	11/3/2014	JH
Metals Digestion		*			EPA 200.9-11	10/23/2014	JMS
Density		0.998	g/mL		Gravimetric	11/4/2014	JH
Nitrate (as N)		< 0.2	mg/L	0.2	EPA 300.0	10/23/2014	NC

MCL = Maximum Contamination Level
MDL = Method/Minimum Detection Limit
UR = Unregulated

Date Report Printed: 11/7/2014 11:59:12

Laboratory Analysis Report

Sample Number: 1442245

NO FIELD TEMP GIVEN; NO TRAVEL BLANKS RCVD; Methane, Ethane, and Ethene testing were performed by Accutest Mountain States (AMS).

Test Requested	MCL	Analysis Result	Units	MDL	Method	Date Completed	Analyst
Benzene		1510	ug/L	0.5	EPA 8260B	10/28/2014	CY
Toluene		830	ug/L	0.5	EPA 8260B	10/28/2014	CY
Ethylbenzene		55.0	ug/L	0.5	EPA 8260B	10/28/2014	CY
Xylene, Total		390	ug/L	0.5	EPA 8260B	10/28/2014	CY
Methane		2.49	mg/L	0.0008	RSKSOP 175	10/27/2014	AMS
Ethane		0.399	mg/L	0.0016	RSKSOP 175	10/27/2014	AMS
Ethene		<0.0024	mg/L	0.0024	RSKSOP 175	10/27/2014	AMS
Alkalinity	UR	332	mg/L CaCO3		EPA 310.1	10/30/2014	CJS
Chloride, Cl	UR	305	mg/L	1	EPA 300.0	10/23/2014	NC
Fluoride, F	4.0	6.88	mg/L	0.10	EPA 300.0	10/23/2014	NC
Sulfate, SO4	UR	34	mg/L	1	EPA 300.0	10/23/2014	NC
pH	UR	8.8	S.U.		SM 4500-H B	10/23/2014	RME
Conductivity	UR	1,880	umhos	2	SM 2510B	10/23/2014	RME
Bicarbonate		302	mg/L		SM 2320	10/30/2014	CJS
Carbonate		29.8	mg/L		SM 2320	10/30/2014	CJS
Hydroxide		0.0	mg/L		SM 2320	10/30/2014	CJS
Resistivity		5.32	ohm*cm			10/23/2014	DS
Total Dissolved Solids	UR	1,540	mg/L	25	SM 2540C	10/28/2014	GM

MCL = Maximum Contamination Level
MDL = Method/Minimum Detection Limit
UR = Unregulated

Thank you for choosing Analytical Laboratories for your testing needs.
If you have any questions concerning this report,
please contact your client manager: **James Hibbs**

Date Report Printed: 11/7/2014 11:59:12

Analytical Laboratories, Inc.

1804 N. 33rd Street
Boise, Idaho 83703
Phone (208) 342-5515

Date Report Printed: 11/21/2014 3:49:55 PM
http://www.analyticallaboratories.com
These test results relate only to the items tested.

Laboratory Analysis Report

Sample Number: 1442246

Attn: JEFF JANIK
ALTA MESA SERVICES, LP
15021 KATY FREEWAY STE 400
HOUSTON, TX 77094

Collected By: J JANIK
Submitted By: J JANIK

Source of Sample:
DJS PROP 2-14 PRODUCOD WATER

Time of Collection: 16:00
Date of Collection: 10/22/2014
Date Received: 10/23/2014
Report Date: 11/21/2014

PWS#:

Field Temp: Temp Rcvd in Lab: 20.4 °C

PWS Name:

NO FIELD TEMP GIVEN; Radiological testing was performed by Summit Environmental (SUM).

Test Requested	MCL	Analysis Result	Units	MDL	Method	Date Completed	Analyst
Gross Alpha	15 pCi	<3	pCi/L	3	EPA 900.0	11/11/2014	SUM
Gross Beta		57+/-5.8	pCi/L	4	EPA 900.0	11/11/2014	SUM

Thank you for choosing Analytical Laboratories for your testing needs.

If you have any questions about this report, or any future analytical needs, please contact your client manager:
James Hibbs

MCL = Maximum Contamination Level
MDL = Method/Minimum Detection Limit
UR = Unregulated

CLIENT CODE=

CHAIN OF CUSTODY RECORD

CLIENT INFORMATION:	PROJECT INFORMATION:
Project Manager: JEFF JANIK	Project Name: DJS PROP. 2-14
Company: ALTA MESA SERVICES	PWS Number:
Address: 15021 KATY FRWY, SUITE 400 HOUSTON, TX 77094	Purchase Order Number:
	Required Due Date:
Phone: 713.824.9427 Fax:	E-mail Address: JJANIK@ALTAMESA.NET
Sampled by: (Please print) JEFF JANIK	Transported by: (Please print) JEFF JANIK

ANALYTICAL LABS, INC.
1804 N. 33rd Street • Boise, ID 83703
(208) 342-5515 • Fax: (208) 342-5591 • 1-800-574-5773
Website: www.analyticallaboratories.com
E-mail: ali@analyticallaboratories.com

TESTS REQUESTED

FOLLOW BOTTLES

Lab ID	Date Sampled	Time Sampled	Sample Description (Source)	Sample Matrix									Remarks:
42245	8/22	4:00	PRODUCED WATER										
	8/22	4:00	"										
	8/22	4:00	"										
	8/22	4:00	"										
	8/22	4:00	"										
	8/22	4:00	"										
42246	8/22	4:00	"										RADS/ALPHA/BETA
	10/22		"										
	RB		"										
			"										

Invoice to: *(If different than above address)*

Special Instructions: * NO field Temp rad / NO Travel Blanks rad

ALLOCATIONS OF RISK: Analytical Laboratories, Inc. will perform preparation and testing services, obtain findings and prepare reports in accordance with Good Laboratory Practices (GLP). If, for any reason, Analytical Laboratories, Inc. errors in the conduct of a test or procedure, their liability shall be limited to the cost of the test or procedure completed in error. Under no circumstances will Analytical Laboratories, Inc. be liable for any other cost associated with obtaining a sample or use of data.

Note: Samples are discarded 21 days after results are reported. Hazardous samples will be returned to client or disposed of at client expense.

	Print Name:	Company:	Date:	Time:
Relinquished By: *(Signature)* [signature]	JEFF JANIK	ALTA MESA SERVICES	8/23/14	9:35 AM
Received By: *(Signature)*				
Relinquished By: *(Signature)*			10/23/14	
Received By: *(Signature)* Jordyn Salyers	Jordyn Salyers	ALI	~~8/23/14~~	9:35 a.m
SAMPLE RECEIPT Total # of Containers: 10	Chains of Custody Seals Y / N / NA	Intact: Y / N / NA Temperature Received:	Condition: *	

20.4°C

REV. 2/19/12 WHITE: STAYS WITH SAMPLE (S) YELLOW: LAB PINK: SAMPLER

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: ALTA MESA INC
Address: 15021 KATY FWY, SUITE 400
HOUSTON, TEXAS 77094
Attn: WADE MOORE

Batch #: 160525003
Project Name: ALTA MESA TANK

Analytical Results Report

Sample Number 160525003-001 **Sampling Date** 5/23/2016 **Date/Time Received** 5/25/2016 12:10 PM
Client Sample ID ALTA MESA TANK BATTERY **Sampling Time**
Matrix Water **Sample Location**
Comments

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Alkalinity	419	mg CaCO3/L	5	5/26/2016	KMC	SM2320B	
Aluminum	ND	mg/L	0.1	6/1/2016	HSW	EPA 200.7	
Arsenic	ND	mg/L	0.01	5/31/2016	HSW	EPA 200.8	
Barium	0.144	mg/L	0.01	5/31/2016	HSW	EPA 200.8	
Boron	6.93	mg/L	1	6/10/2016	HSW	EPA 200.8	
Cadmium	ND	mg/L	0.01	5/31/2016	HSW	EPA 200.8	
Calcium	16.1	mg/L	1	6/1/2016	HSW	EPA 200.7	
Chloride	143	mg/L	1	5/25/2016 4:25:00 PM	MER	EPA 300.0	
Chromium	ND	mg/L	0.1	6/10/2016	HSW	EPA 200.8	
Conductivity	1700	µmhos/cm	10	5/26/2016	KMC	SM2510B	
Copper	ND	mg/L	0.01	5/31/2016	HSW	EPA 200.8	
Cyanide (free)	0.0197	mg/L	0.01	6/6/2016	MER	SM4500CNE	
Fluoride	7.77	mg/L	1	5/25/2016 4:25:00 PM	MER	EPA 300.0	
Gross Alpha	0.013 +/- 1.62	pCi/L	2.43	6/13/2016	JWC	EPA 900.0	
Gross Beta	20.4 +/- 4.00	pCi/L	3.05	6/13/2016	JWC	EPA 900.0	
Iron	2.33	mg/L	0.2	6/1/2016	HSW	EPA 200.7	
Lead	ND	mg/L	0.01	5/31/2016	HSW	EPA 200.8	
Magnesium	ND	mg/L	1	6/1/2016	HSW	EPA 200.7	
Manganese	ND	mg/L	0.1	6/1/2016	HSW	EPA 200.7	
Mercury-CVAFS	0.476	ug/L	0.01	5/31/2016	ETL	EPA 245.7	
NO3/N	ND	mg/L	1	5/25/2016 4:25:00 PM	MER	EPA 300.0	
NO2/N	ND	mg/L	1	5/25/2016 4:25:00 PM	MER	EPA 300.0	
Potassium	40.8	mg/L	1	6/1/2016	HSW	EPA 200.7	
Radium 226	0.05 +/- 0.10	pCi/L	0.12	6/9/2016	JMI	EPA 903.0	
Radium 228	-0.136 +/- 0.555	pCi/L	0.260	6/10/2016	JMI	EPA 904.0	
Selenium	ND	mg/L	0.01	5/31/2016	HSW	EPA 200.8	
Methanol	667	mg/L	25	6/1/2016	TGT	GC/FID	
Silica (as SiO2)	77.5	mg/L	1	6/1/2016	HSW	EPA 200.7	
Silicon	36.2	mg/L	1	6/1/2016	HSW	EPA 200.7	
Silver	ND	mg/L	0.01	5/31/2016	HSW	EPA 200.8	
Sodium	314	mg/L	1	6/1/2016	HSW	EPA 200.7	
TDS	1420	mg/L	50	5/25/2016	KMC	SM 2540C	
TSS	15.7	mg/L	1	5/26/2016	KMC	SM 2540D	
Strontium	0.508	mg/L	0.1	5/31/2016	HSW	EPA 200.8	

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Client: ALTA MESA INC
Address: 15021 KATY FWY, SUITE 400
HOUSTON, TEXAS 77094
Attn: WADE MOORE

Batch #: 160525003
Project Name: ALTA MESA TANK

Analytical Results Report

Sample Number 160525003-001 **Sampling Date** 5/23/2016 **Date/Time Received** 5/25/2016 12:10 PM
Client Sample ID ALTA MESA TANK BATTERY **Sampling Time**
Matrix Water **Sample Location**
Comments

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Sulfate	9.58	mg/L	1	5/25/2016 4:25:00 PM	MER	EPA 300.0	
MBAS	0.166	mg/L 342.4MW LAS	0.1	6/2/2016	KMC	SM5540C	
Thallium	ND	mg/L	0.01	5/31/2016	HSW	EPA 200.8	
Turbidity	48.5	NTU	0.1	5/26/2016	KMC	EPA 180.1	
Uranium	ND	mg/L	0.01	5/31/2016	HSW	EPA 200.8	
Uranium Activity	ND	pCi/L	6.7	5/31/2016	HSW	EPA 200.8	

Authorized Signature

John Coddington, Lab Manager

MCL EPA's Maximum Contaminant Level
ND Not Detected
PQL Practical Quantitation Limit

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013;NV:ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

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Client:	ALTA MESA INC	**Batch #:**	160525003
Address:	15021 KATY FWY, SUITE 400 HOUSTON, TEXAS 77094	**Project Name:**	ALTA MESA TANK
Attn:	WADE MOORE		

Analytical Results Report

Sample Number	160525003-001	**Sampling Date**	5/23/2016	**Date/Time Received**	5/25/2016	12:10 PM
Client Sample ID	ALTA MESA TANK BATTERY	**Sampling Time**		**Extraction Date**	5/26/2016	
Matrix	Water	**Sample Location**				
Comments						

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Diesel	32.3	mg/L	0.1	5/31/2016	TGT	EPA 8015D	
Lube Oil	7.48	mg/L	0.5	5/31/2016	TGT	EPA 8015D	
Gasoline	38.4	mg/L	0.1	6/1/2016	SAT	EPA 8015D	

Surrogate Data

Sample Number 160525003-001

Surrogate Standard	Method	Percent Recovery	Control Limits
4-Bromofluorobenzene	EPA 8015D	111.2	50-150
Hexacosane	EPA 8015D	84.2	50-150

Authorized Signature

John Coddington, Lab Manager

MCL EPA's Maximum Contaminant Level
ND Not Detected
PQL Practical Quantitation Limit

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The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

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Address: 15021 KATY FWY, SUITE 400
HOUSTON, TEXAS 77094
Attn: WADE MOORE

Batch #: 160525003
Project Name: ALTA MESA TANK

Analytical Results Report

Sample Number 160525003-001
Client Sample ID ALTA MESA TANK BATTERY
Matrix Water
Comments

Sampling Date 5/23/2016
Sampling Time
Sample Location

Date/Time Received 5/25/2016 12:10 PM

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
1,1,1,2-Tetrachloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,1,1-Trichloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,1,2,2-Tetrachloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,1,2-Trichloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,1-Dichloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,1-Dichloroethene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,1-dichloropropene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2,3-Trichlorobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2,3-Trichloropropane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2,4-Trichlorobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2,4-Trimethylbenzene	257	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2-Dibromo-3-chloropropane(DBCP)	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2-Dibromoethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2-Dichlorobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2-Dichloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2-Dichloropropane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,3,5-Trimethylbenzene	127	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,3-Dichlorobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,3-Dichloropropane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,4-Dichlorobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
2,2-Dichloropropane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
2-Chlorotoluene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
2-hexanone	ND	ug/L	2.5	6/1/2016	SAT	EPA 8260C	
4-Chlorotoluene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Acetone	13500	ug/L	2.5	6/1/2016	SAT	EPA 8260C	
Acrylonitrile	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Benzene	24800	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Bromobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013;NV:ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

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Client: ALTA MESA INC
Address: 15021 KATY FWY, SUITE 400
HOUSTON, TEXAS 77094
Attn: WADE MOORE

Batch #: 160525003
Project Name: ALTA MESA TANK

Analytical Results Report

Sample Number 160525003-001
Client Sample ID ALTA MESA TANK BATTERY
Matrix Water
Comments

Sampling Date 5/23/2016
Sampling Time
Sample Location

Date/Time Received 5/25/2016 12:10 PM

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Bromochloromethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Bromodichloromethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Bromoform	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Bromomethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Carbon disulfide	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Carbon Tetrachloride	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Chlorobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Chloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Chloroform	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Chloromethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
cis-1,2-dichloroethene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
cis-1,3-Dichloropropene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Dibromochloromethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Dibromomethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Dichlorodifluoromethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Ethylbenzene	1080	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Hexachlorobutadiene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Isopropylbenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
m+p-Xylene	4170	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Methyl ethyl ketone (MEK)	ND	ug/L	2.5	6/1/2016	SAT	EPA 8260C	
Methyl isobutyl ketone (MIBK)	ND	ug/L	2.5	6/1/2016	SAT	EPA 8260C	
Methylene chloride	ND	ug/L	2.5	6/1/2016	SAT	EPA 8260C	
methyl-t-butyl ether (MTBE)	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Naphthalene	59.2	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
n-Butylbenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
n-Propylbenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
o-Xylene	1150	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
p-isopropyltoluene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
sec-Butylbenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013;NV:ID00013; OR:ID200001-002; WA:C595
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Client: ALTA MESA INC
Address: 15021 KATY FWY, SUITE 400
HOUSTON, TEXAS 77094
Attn: WADE MOORE

Batch #: 160525003
Project Name: ALTA MESA TANK

Analytical Results Report

Sample Number 160525003-001
Client Sample ID ALTA MESA TANK BATTERY
Matrix Water
Comments

Sampling Date 5/23/2016
Sampling Time
Sample Location

Date/Time Received 5/25/2016 12:10 PM

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Styrene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
tert-Butylbenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Tetrachloroethene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Toluene	17800	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
trans-1,2-Dichloroethene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
trans-1,3-Dichloropropene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Trichloroethene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Trichloroflouromethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Vinyl Chloride	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	

Surrogate Data

Sample Number 160525003-001

Surrogate Standard	Method	Percent Recovery	Control Limits
1,2-Dichlorobenzene-d4	EPA 8260C	101.6	70-130
4-Bromofluorobenzene	EPA 8260C	99.6	70-130
Toluene-d8	EPA 8260C	99.6	70-130

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013;NV:ID00013; OR:ID200001-002; WA:C595
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Client:	ALTA MESA INC	**Batch #:**	160525003
Address:	15021 KATY FWY, SUITE 400 HOUSTON, TEXAS 77094	**Project Name:**	ALTA MESA TANK
Attn:	WADE MOORE		

Analytical Results Report

Sample Number	160525003-002	**Sampling Date**	5/23/2016	**Date/Time Received**	5/25/2016 12:10 PM
Client Sample ID	TRIP BLANK	**Sampling Time**			
Matrix	Water	**Sample Location**			
Comments					

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
1,1,1,2-Tetrachloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,1,1-Trichloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,1,2,2-Tetrachloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,1,2-Trichloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,1-Dichloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,1-Dichloroethene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,1-dichloropropene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2,3-Trichlorobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2,3-Trichloropropane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2,4-Trichlorobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2,4-Trimethylbenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2-Dibromo-3-chloropropane(DBCP)	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2-Dibromoethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2-Dichlorobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2-Dichloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,2-Dichloropropane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,3,5-Trimethylbenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,3-Dichlorobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,3-Dichloropropane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
1,4-Dichlorobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
2,2-Dichloropropane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
2-Chlorotoluene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
2-hexanone	ND	ug/L	2.5	6/1/2016	SAT	EPA 8260C	
4-Chlorotoluene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Acetone	ND	ug/L	2.5	6/1/2016	SAT	EPA 8260C	
Acrylonitrile	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Benzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Bromobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Bromochloromethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	

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Client: ALTA MESA INC
Address: 15021 KATY FWY, SUITE 400
HOUSTON, TEXAS 77094
Attn: WADE MOORE

Batch #: 160525003
Project Name: ALTA MESA TANK

Analytical Results Report

Sample Number 160525003-002
Client Sample ID TRIP BLANK
Matrix Water
Comments

Sampling Date 5/23/2016
Sampling Time
Sample Location

Date/Time Received 5/25/2016 12:10 PM

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Bromodichloromethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Bromoform	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Bromomethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Carbon disulfide	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Carbon Tetrachloride	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Chlorobenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Chloroethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Chloroform	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Chloromethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
cis-1,2-dichloroethene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
cis-1,3-Dichloropropene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Dibromochloromethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Dibromomethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Dichlorodifluoromethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Ethylbenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Hexachlorobutadiene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Isopropylbenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
m+p-Xylene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Methyl ethyl ketone (MEK)	ND	ug/L	2.5	6/1/2016	SAT	EPA 8260C	
Methyl isobutyl ketone (MIBK)	ND	ug/L	2.5	6/1/2016	SAT	EPA 8260C	
Methylene chloride	ND	ug/L	2.5	6/1/2016	SAT	EPA 8260C	
methyl-t-butyl ether (MTBE)	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Naphthalene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
n-Butylbenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
n-Propylbenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
o-Xylene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
p-isopropyltoluene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
sec-Butylbenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Styrene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	

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Client:	ALTA MESA INC	**Batch #:**	160525003
Address:	15021 KATY FWY, SUITE 400 HOUSTON, TEXAS 77094	**Project Name:**	ALTA MESA TANK
Attn:	WADE MOORE		

Analytical Results Report

Sample Number	160525003-002	**Sampling Date**	5/23/2016	**Date/Time Received**	5/25/2016	12:10 PM
Client Sample ID	TRIP BLANK	**Sampling Time**				
Matrix	Water	**Sample Location**				
Comments						

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
tert-Butylbenzene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Tetrachloroethene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Toluene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
trans-1,2-Dichloroethene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
trans-1,3-Dichloropropene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Trichloroethene	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Trichloroflouromethane	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	
Vinyl Chloride	ND	ug/L	0.5	6/1/2016	SAT	EPA 8260C	

Surrogate Data

Sample Number 160525003-002

Surrogate Standard	Method	Percent Recovery	Control Limits
1,2-Dichlorobenzene-d4	EPA 8260C	102.0	70-130
4-Bromofluorobenzene	EPA 8260C	99.2	70-130
Toluene-d8	EPA 8260C	100.8	70-130

Authorized Signature

John Coddington, Lab Manager

MCL EPA's Maximum Contaminant Level
ND Not Detected
PQL Practical Quantitation Limit

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Client: ALTA MESA INC
Address: 15021 KATY FWY, SUITE 400
HOUSTON, TEXAS 77094
Attn: WADE MOORE

Batch #: 160525003
Project Name: ALTA MESA TANK

Analytical Results Report

Sample Number 160525003-001
Client Sample ID ALTA MESA TANK BATTERY
Matrix Water
Comments

Sampling Date 5/23/2016
Sampling Time
Sample Location

Date/Time Received 5/25/2016 12:10 PM
Extraction Date 5/30/2016

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
1,2,4-Trichlorobenzene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
1,2-Dichlorobenzene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
1,2-Diphenyl hydrazine	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
1,3-Dichlorobenzene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
1,4-Dichlorobenzene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
1-Methylnaphthalene	116	ug/L	10	6/7/2016	HSW	EPA 8270D	
2,3,4,6-Tetrachlorophenol	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
2,3,5,6-Tetrachlorophenol	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
2,4,5-Trichlorophenol	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
2,4,6-Trichlorophenol	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
2,4-Dichlorophenol	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
2,4-Dimethylphenol	571	ug/L	100	6/7/2016	HSW	EPA 8270D	
2,4-Dinitrophenol	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
2,4-Dinitrotoluene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
2,6-Dinitrotoluene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
2-Chloronaphthalene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
2-Chlorophenol	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
2-Methylnaphthalene	245	ug/L	10	6/7/2016	HSW	EPA 8270D	
2-Methylphenol	1330	ug/L	100	6/7/2016	HSW	EPA 8270D	
2-Nitroaniline	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
2-Nitrophenol	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
3,3'-Dichlorobenzidine	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
3+4-Methylphenol	1880	ug/L	100	6/7/2016	HSW	EPA 8270D	
3-Nitroaniline	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
4,6-Dinitro-2-methylphenol	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
4-Bromophenyl-phenylether	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
4-Chloro-3-methylphenol	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
4-Chloroaniline	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
4-Chlorophenyl-phenylether	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
4-Nitroaniline	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
4-Nitrophenol	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Acenaphthene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Acenaphthylene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Aniline	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	

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Client:	ALTA MESA INC	**Batch #:**	160525003
Address:	15021 KATY FWY, SUITE 400 HOUSTON, TEXAS 77094	**Project Name:**	ALTA MESA TANK
Attn:	WADE MOORE		

Analytical Results Report

Sample Number	160525003-001	**Sampling Date**	5/23/2016	**Date/Time Received**	5/25/2016 12:10 PM
Client Sample ID	ALTA MESA TANK BATTERY	**Sampling Time**		**Extraction Date**	5/30/2016
Matrix	Water	**Sample Location**			
Comments					

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Anthracene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Benzidine	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Benzo(ghi)perylene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Benzo[a]anthracene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Benzo[a]pyrene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Benzo[b]fluoranthene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Benzo[k]fluoranthene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Benzyl alcohol	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
bis(2-Chloroethoxy)methane	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
bis(2-Chloroethyl)ether	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
bis(2-chloroisopropyl)ether	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
bis(2-Ethylhexyl)phthalate	22.3	ug/L	10	6/7/2016	HSW	EPA 8270D	
Butylbenzylphthalate	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Carbazole	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Chrysene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Dibenz[a,h]anthracene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Dibenzofuran	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Diethylphthalate	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Dimethylphthalate	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Di-n-butylphthalate	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Di-n-octylphthalate	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Fluoranthene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Fluorene	16.7	ug/L	10	6/7/2016	HSW	EPA 8270D	
Hexachlorobenzene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Hexachlorobutadiene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Hexachlorocyclopentadiene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Hexachloroethane	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Indeno[1,2,3-cd]pyrene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Isophorone	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Naphthalene	265	ug/L	10	6/7/2016	HSW	EPA 8270D	
Nitrobenzene	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Nitrosodimethylamine	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
n-Nitroso-di-n-propylamine	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
n-Nitrosodiphenylamine	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	
Pentachlorophenol	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	

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Client:	ALTA MESA INC	**Batch #:**	160525003
Address:	15021 KATY FWY, SUITE 400 HOUSTON, TEXAS 77094	**Project Name:**	ALTA MESA TANK
Attn:	WADE MOORE		

Analytical Results Report

Sample Number	160525003-001	**Sampling Date**	5/23/2016	**Date/Time Received**	5/25/2016	12:10 PM
Client Sample ID	ALTA MESA TANK BATTERY	**Sampling Time**		**Extraction Date**	5/30/2016	
Matrix	Water	**Sample Location**				
Comments						

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Phenanthrene	48.5	ug/L	10	6/7/2016	HSW	EPA 8270D	
Phenol	3270	ug/L	100	6/7/2016	HSW	EPA 8270D	
Pyrene	21.3	ug/L	10	6/7/2016	HSW	EPA 8270D	
Pyridine	ND	ug/L	10	6/7/2016	HSW	EPA 8270D	

Surrogate Data

Sample Number 160525003-001

Surrogate Standard	Method	Percent Recovery	Control Limits
2,4,6-Tribromophenol	EPA 8270D	104.2	43-120
2-Fluorobiphenyl	EPA 8270D	87.2	58-122
2-Fluorophenol	EPA 8270D	93.4	45-119
Nitrobenzene-d5	EPA 8270D	89.6	58-120
Phenol-d5	EPA 8270D	103.2	52-115
Terphenyl-d14	EPA 8270D	96.0	22-133

Authorized Signature

John W. Codd

John Coddington, Lab Manager

MCL EPA's Maximum Contaminant Level
ND Not Detected
PQL Practical Quantitation Limit

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Login Report

Customer Name: ALTA MESA INC
15021 KATY FWY, SUITE 400
HOUSTON TEXAS 77094

Order ID: 160525003
Order Date: 5/25/2016

Contact Name: WADE MOORE
Project Name: ALTA MESA TANK

Comment:

Sample #: 160525003-001 **Customer Sample #:** ALTA MESA TANK BATTERY

Recv'd: ☑ **Matrix:** Water **Collector:** JEREMY DAVIS **Date Collected:** 5/23/2016
Quantity: 17 **Date Received:** 5/25/2016 12:10:00 PM **Time Collected:**
Comment:

Test	Lab	Method	Due Date	Priority
ALKALINITY	M	SM2320B	5/25/2016	***Normal (~10 Days)***
ALUMINUM ICP	M	EPA 200.7	6/6/2016	***Normal (~10 Days)***
ARSENIC	M	EPA 200.8	6/6/2016	***Normal (~10 Days)***
BARIUM	M	EPA 200.8	6/6/2016	***Normal (~10 Days)***
BORON	M	EPA 200.8	6/6/2016	***Normal (~10 Days)***
BTEX 8260 MOSC	M	EPA 8260C	6/6/2016	***Normal (~10 Days)***
CADMIUM	M	EPA 200.8	6/6/2016	***Normal (~10 Days)***
CALCIUM ICP	M	EPA 200.7	6/6/2016	***Normal (~10 Days)***
CHLORIDE	M	EPA 300.0	6/6/2016	***Normal (~10 Days)***
CHROMIUM	M	EPA 200.8	6/6/2016	***Normal (~10 Days)***
CONDUCTIVITY	M	SM2510B	5/30/2016	***Normal (~10 Days)***
COPPER	M	EPA 200.8	6/6/2016	***Normal (~10 Days)***
CYANIDE FREE SM 4500 CN-E	M	SM4500CNE	6/6/2016	***Normal (~10 Days)***
FLUORIDE	M	EPA 300.0	6/6/2016	***Normal (~10 Days)***
GROSS ALPHA MOSC	M	EPA 900.0	6/6/2016	***Normal (~10 Days)***
GROSS BETA MOSC	M	EPA 900.0	6/6/2016	***Normal (~10 Days)***
IRON ICP	M	EPA 200.7	6/6/2016	***Normal (~10 Days)***
LEAD	M	EPA 200.8	6/6/2016	***Normal (~10 Days)***
MAGNESIUM ICP	M	EPA 200.7	6/6/2016	***Normal (~10 Days)***
MANGANESE ICP	M	EPA 200.7	6/6/2016	***Normal (~10 Days)***
MERCURY-CVAFS	M	EPA 245.7	6/6/2016	***Normal (~10 Days)***
NITRATE/N	M	EPA 300.0	5/25/2016	***Normal (~10 Days)***
NITRITE/N	M	EPA 300.0	5/25/2016	***Normal (~10 Days)***

Customer Name: ALTA MESA INC | **Order ID:** 160525003

15021 KATY FWY, SUITE 400 | **Order Date:** 5/25/2016

HOUSTON TEXAS 77094

Contact Name: WADE MOORE | **Project Name:** ALTA MESA TANK

Comment:

POTASSIUM ICP	M	EPA 200.7	6/6/2016	***Normal (~10 Days)***
RADIUM 226 MOSC	M	EPA 903.0	6/6/2016	***Normal (~10 Days)***
RADIUM 228 MOSC	M	EPA 904.0	6/6/2016	***Normal (~10 Days)***
SELENIUM	M	EPA 200.8	6/6/2016	***Normal (~10 Days)***
SEMIVOLATILES MISC GC/FID	M	GC/FID	5/23/2016	***Normal (~10 Days)***
SILICON ICP	M	EPA 200.7	6/6/2016	***Normal (~10 Days)***
SILVER	M	EPA 200.8	6/6/2016	***Normal (~10 Days)***
SODIUM ICP	M	EPA 200.7	6/6/2016	***Normal (~10 Days)***
SOLIDS - TDS	M	SM 2540C	5/30/2016	***Normal (~10 Days)***
SOLIDS - TSS	M	SM 2540D	5/30/2016	***Normal (~10 Days)***
STRONTIUM	M	EPA 200.8	6/6/2016	***Normal (~10 Days)***
SULFATE	M	EPA 300.0	6/6/2016	***Normal (~10 Days)***
SURFACTANTS	M	SM5540C	5/25/2016	***Normal (~10 Days)***
SVOC 8270D MOSC	M	EPA 8270D	5/30/2016	***Normal (~10 Days)***
THALLIUM	M	EPA 200.8	6/6/2016	***Normal (~10 Days)***
TPHDX MOSC	M	EPA 8015D	6/1/2016	***Normal (~10 Days)***
TPHG MOSC	M	EPA 8015D	6/1/2016	***Normal (~10 Days)***
TURBIDITY	M	EPA 180.1	5/25/2016	***Normal (~10 Days)***
URANIUM	M	EPA 200.8	6/6/2016	***Normal (~10 Days)***
VOC 8260 MOSC	M	EPA 8260C	6/6/2016	***Normal (~10 Days)***

Sample #: 160525003-002 **Customer Sample #:** TRIP BLANK

Recv'd: ☑ **Matrix:** Water **Collector:** **Date Collected:** 5/23/2016

Quantity: 1 **Date Received:** 5/25/2016 12:10:00 PM **Time Collected:**

Comment:

Test	Lab	Method	Due Date	Priority
VOC 8260 MOSC	M	EPA 8260C	6/6/2016	***Normal (~10 Days)***

Customer Name:	ALTA MESA INC	**Order ID:**	160525003
	15021 KATY FWY, SUITE 400	**Order Date:**	5/25/2016
	HOUSTON TEXAS 77094		
Contact Name:	WADE MOORE	**Project Name:**	ALTA MESA TANK
Comment:			

SAMPLE CONDITION RECORD

Samples received in a cooler?	Yes
Samples received intact?	Yes
What is the temperature of the sample(s)? (°C)	5.7
Samples received with a COC?	Yes
Samples received within holding time?	Yes
Are all sample bottles properly preserved?	Yes
Are VOC samples free of headspace?	Yes
Is there a trip blank to accompany VOC samples?	Yes
Labels and chain agree?	Yes

160525 003 **ALTM** Last Due 6/6/2016
1st SAMP 5/23/2016 1st RCVD 5/25/2016
ALTA MESA TANK

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504 E Sprague Ste D, Spokane WA 99202 (509) 838-3999 FAX 838-4433

Chain of Custody Record

Company Name: Alta Mesa Holdings
Address: 4649 Little Willow Rd
City: Payette State: ID Zip: 83661
Phone: 832-248-9390
Fax: N/A

Project Manager: Wade Moore
Project Name & #:
Email Address: wmoore@altamesa.net
Purchase Order #:
Sampler Name & phone:

Turn Around Time & Reporting

Please refer to our normal turn around times at: http://www.anateklabs.com/services/guidelines/reporting.asp

__Normal
__Next Day*
__2nd Day*
__Other*_____

*All rush order requests must be prior approved.

__Phone
__Mail
__Fax
__Email

Provide Sample Description / List Analyses Requested

Lab ID	Sample Identification	Sampling Date/Time	Matrix	# of Containers	Sample Volume	VOC	TPH-Gx	Mercury	Metals	Cyanide	Methonal	Rad 228/226	Alpha Beta	Inorganics	SVOC
-01	Alta Mesa Tank	5/23/16	H2O	3	40ml	X									
	Alta Mesa Tank	5/23/16	H2O	2	40ml		X								
	Alta Mesa Tank	5/23/16	H2O	2	40ml			X							
	Alta Mesa Tank	5/23/16	H2O	1	250ml				X						
	Alta Mesa "	5/23/16	H2O	1	250ml					X					
	Alta Mesa "	5/23/16	H2O	1	250ml						X				
	Alta Mesa	5/23/16	H2O	2	1L							X			
	Alta Mesa	5/23/16	H2O	1	1L								X		
	Alta Mesa	5/23/16	H2O	1	1L									X	
	Alta Mesa	5/23/16	H2O	1	1L										X
	Alta Mesa	5/23/16	H2O	1	1L	TPH-Dx			-						
	Alta Mesa	5/23/16	H2O	1	1L	PAH									
-02	Trip Blank														

Note Special Instructions/Comments

1 trip blank
18 containers
MWBS

	Printed Name	Signature	Company	Date	Time
Relinquished by					
Received by	Nell Lokteff	Nell Lokteff	Anatek	05/24	12:10
Relinquished by					
Received by					
Relinquished by					
Received by					

Inspection Checklist

Received Intact? (Y) N
Labels & Chains Agree? Y N
Containers Sealed? (Y) N
VOC Head Space? Y N
FedEx
Temperature (°C): 5.7 IR-1
Preservative: NAOH (14-1), HCL, HCL (1621)
Date & Time: 05/24/16 12:10
Inspected By: NL

18 containers

LAW OFFICES

MARCUS, CHRISTIAN, HARDEE & DAVIES, LLP

THE MARCUS LAW BUILDING

737 NORTH 7TH STREET
BOISE, IDAHO 83702-5595

CRAIG MARCUS
BARRY MARCUS*
MICHAEL CHRISTIAN
TRENT MARCUS
DANIEL R. HARDEE
BO DAVIES
GREG K. HARDEE
SAM DOTTERS-KATZ
RICH M. PIÑOL

TELEPHONE
(208) 342-3563
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(208) 342-2170

*Also Admitted to the California State Bar

February 1, 2018

ed.hagan@deq.idaho.gov
barry.burnell@deq.idaho.gov

Barry Burnell, Water Quality Division Administrator
Ed Hagan, Ground Water Program Manager
Idaho Department of Environmental Quality
1410 N. Hilton
Boise, ID 83706

Re: Alta Mesa Services, LP

Dear Barry and Ed:

Further to our in-person discussion in December, I am writing on behalf of Alta Mesa Services, LP ("AM") regarding the status of the proposed injection zone for AM's planned Class II injection well under DEQ's ground water rules. AM proposes to repurpose the existing DJS Properties #2-14 oil and gas well to a Class II injection well for disposal of produced water from nearby producing oil and gas wells. The proposed injection zone is at a depth of approximately 4,910' to 5,510' TVD (true vertical depth), and is a quartz rich sandstone located in the Chalk Hills Formation. The sand contains water, hydrocarbons and related constituents. It is confined by the overlying Glenn's Ferry Formation and upper members of the Chalk Hills Formation. AM has submitted an application to the U.S. Environmental Protection Agency to permit the well as a Class II injection well, and is awaiting the transfer of primacy over Class II wells under the federal Underground Injection Control program from IDWR to EPA before that application can be processed. I am sending you complete copies of the application materials for your reference under separate cover.

DEQ's jurisdiction over ground water quality remains an important subject. When we met, I raised the point that for aquifer classification under IDAPA 58.01.11.350 to be the appropriate path, the proposed injection zone must first meet the definition of an "aquifer" set forth in IDAPA 58.01.11.007.02, i.e., it must be "capable of yielding economically significant quantities of water to wells and springs." If it does not fall within that definition then logically there is no aquifer to classify. However, water in the proposed injection zone remains "ground water," as

IDAPA 58.01.11.007.16 makes clear that any water "which occurs beneath the surface of the earth in a saturated geological formation of rock or soil" is groundwater, even if it does not exist in an "aquifer." This indicates either (1) if the constituents in injected fluids are below "natural background levels" as defined in IDAPA 58.01.11.007.23, then IDAPA 58.01.11.200.03 provides no action is required; or (2) under IDAPA 58.01.11.400.05 the Department may "allow site-specific ground water quality levels" or "may allow site specific points of compliance" in "[s]ituations where the site background level varies from the groundwater quality standard" or "[o]ther situations authorized by the Department in writing," based on "consideration of effects to human health and the environment."

With this letter I am supplying information from which the Department may conclude that the proposed injection zone does not fall within the definition of an "aquifer" under Rule 007.02, because given the depth of the zone and the existing constituents in the water found there, it is not "capable of yielding economically significant quantities of water to wells and springs." This information is in three categories. First, information regarding the cost in equipment to drill to and produce water from the proposed injection zone; second, information regarding the character of the water and the cost in equipment for a facility necessary to eliminate BTEX, other hydrocarbons and other substances from the water to bring it to ground water standards; and third, information regarding the ongoing cost to operate the well and associated treatment facility. The information illustrates that the water is so expensive to reach and produce, and is of a character that it would be so expensive to treat it to enable beneficial use, that the proposed injection zone will never yield economically significant quantities of water to wells and springs. I include a comparison to the cost of available irrigation water in the area. The expenses I summarize below are detailed in the spreadsheet attached as Exhibit A, entitled "Deep Aquifer Utilization Costs," and in proposals from Global Advantech Resources, Ltd. regarding water treatment, which are attached as Exhibits B and C.

1. <u>Cost of production</u>.

The proposed injection zone is an approximately 590' thick sand beginning at 4,910' TVD. A composite lithological section illustration from the DJS Properties #2-14 well is attached as Exhibit D. The lithology of the overlying formations includes sandstone, lacustrine claystone, bentonite, silty claystone, basalt, and volcanic tuffs. AM has drilled eight oil and gas wells to similar depths in the area, and is currently drilling a ninth well. As a result it has extensive experience with the cost to drill in this setting. Drilling to nearly a mile deep requires a large rig with sufficient power and adequately sized pumps. For example, AM's current well, the Barlow #1-14 is drilling to a total depth of 5,800', using Paul Graham Drilling's Rig #7. A specification sheet for that rig is attached as Exhibit E. No rigs of this size are readily available in Idaho; any rig would have to be contracted and mobilized from a significant oil and gas producing state such as California, Colorado, or Wyoming. Including construction of a location (pad) on which to assemble the rig[1] and a short access road drilling cost to the proposed injection zone is estimated based on AM's recent experience at $2,300,000.[2] Equipping the well with a submersible pump sufficient to produce 1,000 barrels per day of water to the surface is estimated to cost an additional $200,000. The proposed injection zone is located in a rural area, requiring three-phase electrical service to be installed (both for operating the well pump and operating the associated treatment facility, discussed further below). Installation of 480V service on site is estimated at $1,380,000.

2. Cost of treatment facility.

An analytical report of water sampled from perforations at the 5,380'-5,390' level in the DJS Properties #2-14 well, i.e., in the proposed injection zone, is attached as Exhibit F. It reflects elevated levels of aluminum, barium, boron, calcium, potassium, silican, sodium, benzene, toluene, ethylbenzene, xylene, methane, ethane, chloride, fluoride, and sulfate, with TDS of over 1,500. Levels of BTEX compounds in particular are quite high. In short, the water in the proposed injection zone is unusable without significant treatment. It is similar to produced water from AM's producing wells. An analytical report of samples from AM's produced water tank battery at its Little Willow separation facility is attached as Exhibit G; it reflects similar characteristics, with the addition of some drilling fluid and production treatment components.

AM obtained cost information from an industry specialist in produced water treatment, Global Advantech Resources, Ltd. in the context of evaluating the economic viability of evaporative disposal of produced water. Global's proposals involved utilizing electrocoagulation, activated carbon absorption, ultrafiltration and air stripping, in order to capture the range of constituents present in produced water from AM's producing oil and gas wells. Cost estimates ranged from more than $3,000,000 to more than $4,000,000, depending on treatment rate. A copy of Global's proposal to AM reflecting a cost of over $3,000,000 for a treatment system capable of processing 30 barrels per hour, to wastewater reuse standards, is attached as Exhibit B. A copy of Global's report to AM reflecting an initial capital cost estimate of $4,071,000 for a treatment system capable of treating 60 barrels per hour to Groundwater Rule standards, not inclusive of piping and tanks, installation, controls, and other items for a permanent installation, is attached as Exhibit C. The items not included would add an additional several hundred thousand dollars to the cost.

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[1] Large drill rigs such as the Graham Rig #7, and their associated generators, pumps, tanks and other equipment are very heavy. A compacted and graveled pad normally is required in order to keep the rig from settling into the native soils.

[2] AM can make available for the Department's review the Authorizations for Expenditure ("AFEs") detailing the cost of drilling each of the nine wells.

3. Operating Cost.

The report from Global Advantech Resources indicates an operating cost for the water treatment system (not including power, labor and maintenance to operate the water well itself) of about $70,000 per month. While AM believes operational efficiencies may be achieved, it still foresees operating cost of about $70,000 per month for both the water well and treatment facility. 1,000 barrels of water per day is insignificant from an agricultural use (irrigation) perspective. One acre foot of water is equivalent to 7,758 barrels (1 barrel = 42 U.S. gallons). 1,000 barrels per day is the equivalent of 0.1289 acre feet per day. IDWR assumes 0.02 cfs per acre irrigated per day, or .03967 acre feet.[3] By way of another example, alfalfa is reported to require 20 to 46 inches per acre per year, or about 1.67 to 3.83 acre feet per irrigating season.[4] Thus, irrigating a ten-acre tract will consume about .2 acre feet per day. The approximate production from a water well, as described, to the proposed injection zone could irrigate less than 10 acres.[5]

The operating cost summarized above equates to about $84,000 per acre per year for a 10 acre tract. Assuming irrigation needs of 3 acre feet per acre per year, this means operating cost of about $3.61 *per barrel* of water – not taking into account the amortized capital cost of the well and treatment facility. Even assuming a relatively long amortization period of 15 years, the total cost per barrel would be double or more, i.e., $7 to 8 per barrel of water, or $54,000 to $62,000 per acre foot of water annually.

In contrast, irrigation water is available locally for about $100 per acre per year, with excess water available at $20 per acre foot.[6]

From another perspective, domestic water is available from the City of Payette at a rate of $0.238 per 100 gallons.[7] $7.00 per barrel equates to $16.67 per hundred gallons, or about 70 times the rate available from a utility.

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[3] *See* https://www.idwr.idaho.gov/water-rights/water-use-information.html .

[4] *See* http://www.uidaho.edu/~/media/UIdaho-Responsive/Files/Extension/Drought/Alfalfa-Irrigation-Facts.ashx. Nationally irrigation rates were 2.07 acre feet per year in 2010. https://water.usgs.gov/edu/wuir.html .

[5] The normal irrigation season in southwest Idaho is 150 to 180 days. While the well could theoretically operate year round to produce more water, this would require construction of a storage facility, the cost of which would also be prohibitive.

[6] *See* http://www.blackcanyonirrigation.com/Rate_Information.html.

[7] *See* http://www.cityofpayette.com/index.asp?SEC=2C7B73EC-6162-4ACD-8F16-0230B1152EAE&Type=B_BASIC

4. Summary

To produce and render useable water from the proposed injection zone would involve a capital cost of several million dollars in drilling and equipping a well, and in constructing and commissioning a water treatment system capable of dealing with the BTEX and other problematic constituents of the water present in the proposed injection zone. That cost would result in a stream of water only adequate to irrigate a handful of acres. Ongoing operating costs would be hundreds of thousands of dollars a year. Meanwhile, irrigation water is available locally for about $1000 per year for the same size tract. Domestic water is available for about 1.4% of the cost producing and treating water from the proposed injection zone. No person or business would rationally choose to attempt to drill to and exploit the water in the proposed injection zone under these circumstances. Based on the above discussion, I suggest that the proposed injection zone is not, and will not in the foreseeable future be, capable of producing economically significant quantities of water to wells or springs, and consequently is not an "aquifer" as defined in IDAPA 58.01.11.007.02. You may wish to be provided additional information and support for the items discussed above, and AM would like to schedule a follow up meeting soon to discuss next steps.

Very truly yours,

MARCUS, CHRISTIAN, HARDEE & DAVIES, LLP

Michael Christian

MC:
Enclosure(s)
cc: Dale Hayes, Alta Mesa Services, LP

AM Idaho LLC
15021 Katy Freeway, Suite 400
Houston, TX 77094

October 4, 2018

Evan Osborne
EPA Region 10 UIC Program
1200 Sixth Ave., Suite 155, OCE-101
Seattle, WA 98101

Re: AM Idaho, LLC Class II UIC permit application No. ID2001-A
OCE-201

Dear Mr. Osborne:

Submitted with this letter and certification are the following:

1. A letter to you from Michael Christian, attorney for AM Idaho LLC, of even date with this letter and certification;

2. A revised EPA Form 7520-6 reflecting that AM Idaho LLC is the applicant owner and operator, signed by me as a responsible corporate officer for AM Idaho LLC.

3. As Attachment T to the application, a listing of all other related permits or construction approvals as required under 40 CFR § 144.31(6), specifically, air program permits to construct issued by the Idaho Department of Environmental Quality for four oil and gas wells and one oil and gas gathering facility in Payette County, Idaho owned by AM Idaho LLC.

4. Resubmittal of the materials previously provided by Mr. Christian on September 11, 2018, including:

    a. His letter of that date;
    b. The revised Attachments A-U submitted with that letter;
    c. A copy of a February 1, 2018 letter from Mr. Christian to Barry Burnell of the Idaho Department of Environmental Quality, discussing facts supporting aquifer exemption; and
    d. Copies of the attachments referenced in the IDEQ letter.

With respect to each of the above documents and attachments:

I certify under penalty of law that these documents and attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Very truly yours,

F. David Murrell, Vice President – Land
AM Idaho LLC

From: Michael Christian
To: Osborne, Evan; Thurmon, Clarke
Subject: UIC Permit Application No. ID2D001-A
Date: Thursday, October 4, 2018 2:34:56 PM
Attachments: EPA Permit Application.pdf
Attachment T.docx
Class II Application Form Letter_AM Idaho.pdf
l-osborne.9.11.18.pdf
EPA Class II Injection Permit Attachments_Edited_9.10.18.docx
l-barry burnell.2.1.18.pdf
Exhibit A.xlsx
Exhibit B Part 1.pdf
Exhibit B Part 2.pdf
Exhibit B Part 3.pdf
Exhibit C.pdf
Exhibit D.pptx
Exhibit E.pdf
Exhibit F.pdf
Exhibit G.pdf
l-osborne.10.4.18.pdf

Evan –

Attached to this email, please find the following in follow up to your letter to Dale Hayes dated September 25, 2018:

1. My letter to you of today's date setting out the additional information being supplied or resubmitted;

2. A revised EPA Form 7520-6 reflecting that AM Idaho LLC is the applicant owner and operator, signed by a responsible corporate office, F. David Murrell, who is the Vice President of Land for AM Idaho LLC.

3. As Attachment T to the application, a listing of all other related permits or construction approvals as required under 40 CFR 144.31(6), specifically, air program permits to construct issued by the Idaho Department of Environmental Quality for four oil and gas wells and one oil and gas gathering facility in Payette County, Idaho owned by AM Idaho LLC.

4. Resubmittal of the materials previously provided by me on September 11, 2018, including:

    a. My letter of that date;
    b. The revised Attachments A-U submitted with that letter;
    c. A copy of a February 1, 2018 letter from me to Barry Burnell of the Idaho Department of Environmental Quality, discussing facts supporting aquifer exemption; and
    d. Copies of the attachments referenced in the IDEQ letter.

5. A certification pursuant to 40 CFR 144.32(d), signed by F. David Murrell, Vice President of Lands of AM Idaho LLC as responsible corporate officer regarding the documents listed in items 3 and 4, above, and regarding my letter of today's date.

Please let me know if you have any questions or need additional information.

Thanks,
Mike

Michael Christian
MARCUS, CHRISTIAN, HARDEE & DAVIES, LLP
737 N. 7th Street
Boise, ID 83702
(208) 342-3563
mchristian@mch-lawyer.com

OMB No. 2040-0042 Approval Expires 12/31/2018

EPA

United States Environmental Protection Agency

Underground Injection Control Permit Application

(Collected under the authority of the Safe Drinking Water Act. Sections 1421, 1422, 40 CFR 144)

I. EPA ID Number

	T/A	C
U OCT 16 2017		

Read Attached Instructions Before Starting

For Official Use Only

Application approved (mo day year)	Date received (mo day year)	Permit Number	Well ID	FINDS Number

II. Owner Name and Address

Owner Name			
Alta Mesa Services, LP			
Street Address		Phone Number	
15021 Katy Freeway, Suite 400		(281) 530-0991	
City	State	ZIP CODE	
Houston	TX	77094	

III. Operator Name and Address

Owner Name			
Alta Mesa Services, LP			
Street Address		Phone Number	
15021 Katy Freeway, Suite 400		(281) 530-0991	
City	State	ZIP CODE	
Houston	TX	77094	

IV. Commercial Facility	V. Ownership	VI. Legal Contact	VII. SIC Codes
[x] Yes [ ] No	[x] Private [ ] Federal [ ] Other	[x] Owner [ ] Operator	NAICS=211111 SIC = 1311

VIII. Well Status *(Mark "x")*

[ ] A Operating	Date Started (mo day year)	[x] B. Modification/Conversion	[x] C. Proposed

IX. Type of Permit Requested *(Mark "x" and specify if required)*

	Number of Existing Wells	Number of Proposed Wells	Name(s) of field(s) or project(s)
[x] A. Individual [ ] B. Area	1 (One)	1 (One)	DJS Properties 2-14

X. Class and Type of Well *(see reverse)*

A. Class(es) (enter code(s))	B. Type(s) (enter code(s))	C. If class is "other" or type is code 'x,' explain	D. Number of wells per type (if area permit)
Class II	Type D	N/A	1 (One)

XI. Location of Well(s) or Approximate Center of Field or Project

Latitude Deg	Latitude Min	Latitude Sec	Longitude Deg	Longitude Min	Longitude Sec	Sec	Twp	Range	1/4 Sec	Feet From	Line	Feet From	Line
44	02	19.2	116	46	60	14	8N	4W	NW	95	NL	2315	WL

XII. Indian Lands *(Mark 'x')*

[ ] Yes
[x] No

XIII. Attachments

(Complete the following questions on a separate sheet(s) and number accordingly; see instructions)

For Classes I, II, III, (and other classes) complete and submit on a separate sheet(s) Attachments A–U (pp 2-6) as appropriate. Attach maps where required. List attachments by letter which are applicable and are included with your application.

XIV. Certification

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32)

A. Name and Title *(Type or Print)*	B. Phone No. *(Area Code and No.)*
Dale R. Hayes, VP Frontier Operations	(281) 943-1347
C. Signature	D. Date Signed
DR Hayes	08/07/2017

Well Class and Type Codes

Class I		Wells used to inject waste below the deepest underground source of drinking water.
Type	**"I"**	Nonhazardous industrial disposal well
	"M"	Nonhazardous municipal disposal well
	"W"	Hazardous waste disposal well injecting below USDWs
	"X"	Other Class I wells (not included in Type "I," "M," or "W")
Class II		Oil and gas production and storage related injection wells.
Type	**"D"**	Produced fluid disposal well
	"R"	Enhanced recovery well
	"H"	Hydrocarbon storage well (excluding natural gas)
	"X"	Other Class II wells (not included in Type "D," "R," or "H")
Class III		Special process injection wells.
Type	**"G"**	Solution mining well
	"S"	Sulfur mining well by Frasch process
	"U"	Uranium mining well (excluding solution mining of conventional mines)
	"X"	Other Class III wells (not included in Type "G," "S," or "U")

Other Classes Wells not included in classes above.
Class V wells which may be permitted under §144.12.
Wells not currently classified as Class I, II, III, or V.

Attachments to Permit Application

Class	**Attachments**
I new well	A, B, C, D, F, H – S, U
existing	A, B, C, D, F, H – U
II new well	A, B, C, E, G, H, M, Q, R; optional – I, J, K, O, P, U
existing	A, E, G, H, M, Q, R, – U; optional – J, K, O, P, Q
III new well	A, B, C, D, F, H, I, J, K, M – S, U
existing	A, B, C, D, F, H, J, K, M – U
Other Classes	To be specified by the permitting authority

Well Class and Type Codes

Class I		Wells used to inject waste below the deepest underground source of drinking water.
Type	**"I"**	Nonhazardous industrial disposal well
	"M"	Nonhazardous municipal disposal well
	"W"	Hazardous waste disposal well injecting below USDWs
	"X"	Other Class I wells (not included in Type "I," "M," or "W")
Class II		Oil and gas production and storage related injection wells.
Type	**"D"**	Produced fluid disposal well
	"R"	Enhanced recovery well
	"H"	Hydrocarbon storage well (excluding natural gas)
	"X"	Other Class II wells (not included in Type "D," "R," or "H")
Class III		Special process injection wells.
Type	**"G"**	Solution mining well
	"S"	Sulfur mining well by Frasch process
	"U"	Uranium mining well (excluding solution mining of conventional mines)
	"X"	Other Class III wells (not included in Type "G," "S," or "U")

Other Classes Wells not included in classes above.
Class V wells which may be permitted under §144.12.
Wells not currently classified as Class I, II, III, or V.

Attachments to Permit Application

Class	**Attachments**
I new well	A, B, C, D, F, H – S, U
existing	A, B, C, D, F, H – U
II new well	A, B, C, E, G, H, M, Q, R; optional – I, J, K, O, P, U
existing	A, E, G, H, M, Q, R, – U; optional – J, K, O, P, Q
III new well	A, B, C, D, F, H, I, J, K, M – S, U
existing	A, B, C, D, F, H, J, K, M – U
Other Classes	To be specified by the permitting authority

INSTRUCTIONS - Underground Injection Control (UIC) Permit Application

Paperwork Reduction Act: The public reporting and record keeping burden for this collection of information is estimatedto average 224 hours for a Class I hazardous well application, 110 hours for a Class I non-hazardous well application,67 hours for a Class II well application, and 132 hours for a Class III well application. Burden means the total time, effort, or financial resource expended by persons to generate, maintain, retain, or disclose or provide information to or for a Federal Agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collectingvalidating, and verifying information, processing and maintaining information, and disclosing andproviding information; adjust the existing ways to comply with any previously applicable instructions and requirements;train personnel to be able to respond to the collection of information; search data sources; complete and review the collection of information; and, transmit or otherwise disclosethe information. An agency may not conduct or sponsor, and a person is not required to respond to, a collectionofinformation unless it displays a currently valid OMB control number. Send comments on the Agency's need for this information, the accuracyof the provided burden estimates, and any suggested methods for minimizing respondentburden, including the use of automated collection techniques to Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822), 1200 Pennsylvania Ave., NW, Washington, DC 20460. Include the OMB control number in any correspondence. Do not send the completed forms to this address.

This form must be completed by all owners or operators of Class I, II, and III injection wells and others who may be directed to apply for permit by the Director.

I. **EPA I.D. NUMBER** - Fill in your EPA Identification Number. If you do not have a number, leave blank.

II. **OWNER NAME AND ADDRESS** - Name of well, well field or company and address.

III. **OPERATOR NAME AND ADDRESS** - Name and address of operator of well or well field.

IV. **COMMERCIAL FACILITY** - Mark the appropriate box to indicate the type of facility.

V. **OWNERSHIP** - Mark the appropriate box to indicate the type of ownership.

VI. **LEGAL CONTACT** - Mark the appropriate box.

VII. **SIC CODES** - List at least one and no more than four Standard Industrial Classification (SIC) Codes that best describe the nature of the business in order of priority.

VIII. **WELL STATUS** - Mark Box A if the well(s) were operating as injection wells on the effective date of the UIC Program for the State. Mark Box B if wells(s) existed on the effective date of the UIC Program for the State but were not utilized for injection. Box C should be marked if the application is for an underground injection project not constructed or not completed by the effective date of the UIC Program for the State.

IX. **TYPE OF PERMIT** - Mark "Individual" or "Area" to indicate the type of permit desired. Note that area permits are at the discretion of the Director and that wells covered by an area permit must be at one site, under the control of one person and do not inject hazardous waste. If an area permit is requested the number of wells to be included in the permit must be specified and the wells described and identified by location. If the area has a commonly used name, such as the "Jay Field," submit the name in the space provided. In the case of a project or field which crosses State lines, it may be possible to consider an area permit if EPA has jurisdiction in both States. Each such case will be considered individually, if the owner/operator elects to seek an area permit.

X. **CLASS AND TYPE OF WELL** - Enter in these two positions the Class and type of injection well for which a permit is requested. Use the most pertinent code selected from the list on the reverse side of the application. When selecting type X please explain in the space provided.

XI. **LOCATION OF WELL** - Enter the latitude and longitude of the existing or proposed well expressed in degrees, minutes, and seconds or the location by township, and range, and section, as required by 40 CFR Part 146. If an area permit is being requested, give the latitude and longitude of the approximate center of the area.

XII. **INDIAN LANDS** - Place an "X" in the box if any part of the facility is located on Indian lands.

XIII. **ATTACHMENTS** - Note that information requirements vary depending on the injection well class and status. Attachments for Class I, II, III are described on pages 4 and 5 of this document and listed by Class on page 2. Place EPA ID number in the upper right hand corner of each page of the Attachments.

XIV. **CERTIFICATION** - All permit applications (except Class II) must be signed by a responsible corporate officer for a corporation, by a general partner for a partnership, by the proprietor of a sole proprietorship, and by a principal executive or ranking elected official for a public agency. For Class II, the person described above should sign, or a representative duly authorized in writing.

INSTRUCTIONS - Attachments

Attachments to be submitted with permit application for Class I, II, III and other wells.

A. **AREA OF REVIEW METHODS** - Give the methods and, if appropriate, the calculationsused to determine the size of the area of review (fixed radius or equation).The area of review shall be a fixed radius of 1/4 mile from the well bore unless the use of an equation is approved in advance by the Director.

B. **MAPS OF WELL/AREA AND AREA OF REVIEW** - Submit a topographic map, extending one mile beyond the property boundaries, showing the injection well(s) or project area for which a permit is sought and the applicable area of review. The map must show all intake and discharge structures and all hazardous waste treatment, storage, or disposal facilities. If the application is for an area permit, the map should show the distribution manifold (ifapplicable) applying injection fluid to all wells in the area, including all system monitoring points. Within the area of review, the map must show the following:

Class I

The number, orname, and location ofall producing wells, injection wells, abandoned wells, dryholes, surface bodies of water, springs, mines (surface and subsurface), quarries, and other pertinent surface features, including residences and roads, and faults, ifknown or suspected. In addition, the map mustidentify thosewells, springs, other surface water bodies, anddrinking water wells located within one quarter mile of the facility property boundary. Only information of public record is required to be included in this map;

Class II

In addition to requirements for Class I, include pertinent information known to the applicant. This requirement does not apply to existing Class II wells;

Class III

In addition to requirements for Class I, include public water systems and pertinent information known to the applicant.

C. **CORRECTIVE ACTION PLAN AND WELL DATA** - Submita tabulation of data reasonably available from public records or otherwise known to the applicant on all wells within the area of review, including those on the map required in B, which penetrate the proposed injection zone. Such data shall include the following:

Class I

Adescription ofeach well's types, construction, date drilled, location, depth, record ofplugging and/or completion, and any additional information the Director may require. In the case of new injection wells, include thecorrective action proposed to be taken by the applicant under 40 CFR 144.55.

Class II

In addition to requirement for Class I, in the case of Class II wellsoperating over the fracture pressure ofthe injection formation, all known wells within the area ofreview which penetrate formations affected by the increase in pressure. This requirement does not apply to existing Class II wells.

Class III

In addition to requirements for Class I, the corrective action proposed under 40 CFR 144.55 for all Class III wells.

D. **MAPS AND CROSS SECTION OF USDWs** - Submit maps and cross sections indicating the vertical limits of all underground sources of drinking water within the area of review (both vertical and lateral limits for Class I), their position relative to the injection formation and the direction of water movement, where known, in every underground source of drinking water which may be affected by the proposed injection. (Does not apply to Class II wells.)

E. **NAME AND DEPTH OF USDWs (CLASS II)** - For Class II wells, submit geologic name, and depth to bottom of all underground sources of drinking water which may be affected by the injection.

F. **MAPS AND CROSS SECTIONS OF GEOLOGIC STRUCTURE OF AREA** - Submit maps and cross sections detailingthe geologic structure ofthe local area (including the lithology of injection and confining intervals) andgeneralized maps and cross sections illustrating the regional geologic setting. (Does not apply to Class II wells.)

G. **GEOLOGICAL DATA ON INJECTION AND CONFINING ZONES (Class II)** - For Class II wells, submit appropriate geological data on the injection zone and confining zones including lithologic description, geological name, thickness, depth and fracture pressure.

H. **OPERATING DATA** - Submit the following proposed operating data foreach well (including all those to be covered by area permits): (1) average and maximum dailyrate and volume ofthe fluids to be injected; (2) average and maximum injection pressure; (3) nature of annulus fluid; (4) for Class I wells, source and analysis ofthe chemical, physical, radiological and biological characteristics, including density and corrosiveness, of injection fluids; (5) for Class II wells, source and analysis of the physical andchemical characteristics of the injection fluid; (6) for Class III wells, a qualitative analysis and ranges in concentrations ofall constituents ofinjected fluids. If the information is proprietary, maximum concentrations only may be submitted, but all records must be retained.

I. **FORMATION TESTING PROGRAM** - Describe the proposed formation testing programFor Class I wells the program must be designed to obtain data on fluid pressure, temperature, fracture pressure, other physical, chemical, and radiological characteristics of the injection matrix and physical and chemical characteristics of the formation fluids.

For Class II wells the testing program must be designed to obtain data on fluid pressure, estimated fracture pressure, physical and chemical characteristics of the injection zone. (Does not apply to existing Class II wells or projects.)

For Class III wells the testing must bedesigned to obtain data on fluid pressure, fracture pressure, and physical and chemical characteristics of the formation fluids if theformation is naturally water bearing. Only fracture pressure is required if the program formation is not water bearing. (Does not apply to existing Class III wells or projects.)

J. **STIMULATION PROGRAM** - Outline any proposed stimulation program.

K. **INJECTION PROCEDURES** - Describe the proposed injection procedures including pump, surge, tank, etc.

L. **CONSTRUCTION PROCEDURES** - Discuss the construction procedures (according to §146.12 forClass I, §146.22 for Class II, and §146.32 for Class III) to be utilized. This should include details of the casing and cementing program, logging procedures, deviation checks, and the drilling, testing and coring program, and proposed annulus fluid. (Request and submission of justifying data must be made to use an alternative to packer for Class I.)

M. **CONSTRUCTION DETAILS** - Submit schematic or other appropriate drawings of the surface and subsurface construction details of the well.

N. **CHANGES IN INJECTED FLUID** - Discuss expected changes in pressure, native fluid displacement, and direction of movement of injection fluid. (Class III wells only.)

O. **PLANS FOR WELL FAILURES** - Outline contingency plans (proposed plans, if any, for Class II) to cope with all shut-ins or wells failures, so as to prevent migration of fluids into any USDW.

P. **MONITORING PROGRAM** - Discuss the planned monitoring program. This should be thorough, including maps showing the number and location ofmonitoring wells as appropriate and discussion ofmonitoring devices, sampling frequency, and parameters measured. If a manifold monitoring program is utilized, pursuant to §146.23(b)(5), describe the program and compare it to individual well monitoring.

Q. **PLUGGING AND ABANDONMENT PLAN** - Submit a plan for plugging and abandonment of the well including: (1) describe the type, number, and placement (including the elevation of the top and bottom) of plugs to be used; (2) describe the type, grade, and quantity of cement to be used; and (3) describe the method to be sed to place plugs, including the method used to place the welIn a state of static equilibrium prior to placement of the plugs. Also for a Class III well that underlies or is in an exempted aquifer, demonstrate adequate protection oUSDWs. Submit this information on EPA Form 7520-14, Plugging and Abandonment Plan.

R. **NECESSARY RESOURCES** - Submit evidence such as a surety bond or financial statement to verify that the resources necessary to close, plug or abandon the well are available.

S. **AQUIFER EXEMPTIONS** - If an aquifer exemption is requested, submit data necessary to demonstrate that the aquifer meets the following criteria: (1) does not serve as a source of drinking water; (2) cannot now and will not in the future serve as a source of drinking water; and (3) the TDS content of the ground water is more than 3,000 and less than 10,000 mg/l and is not reasonably expected to supply a public water system. Data to demonstrate that the aquifer is expected to be mineral or hydrocarbon production, such as general description of the mining zone, analysis of the amenability of the mining zone to the proposed method, and time table for proposed development must also be included. For additional information on aquifer exemptions, see 40 CFR Sections 144.7 and 146.04.

T. **EXISTING EPA PERMITS** - List program and permit number of any existing EPA permits, for example, NPDES, PSD, RCRA, etc.

U. **DESCRIPTION OF BUSINESS** - Give a brief description of the nature of the business.

EPA CLASS II INJECTION WELL PERMIT

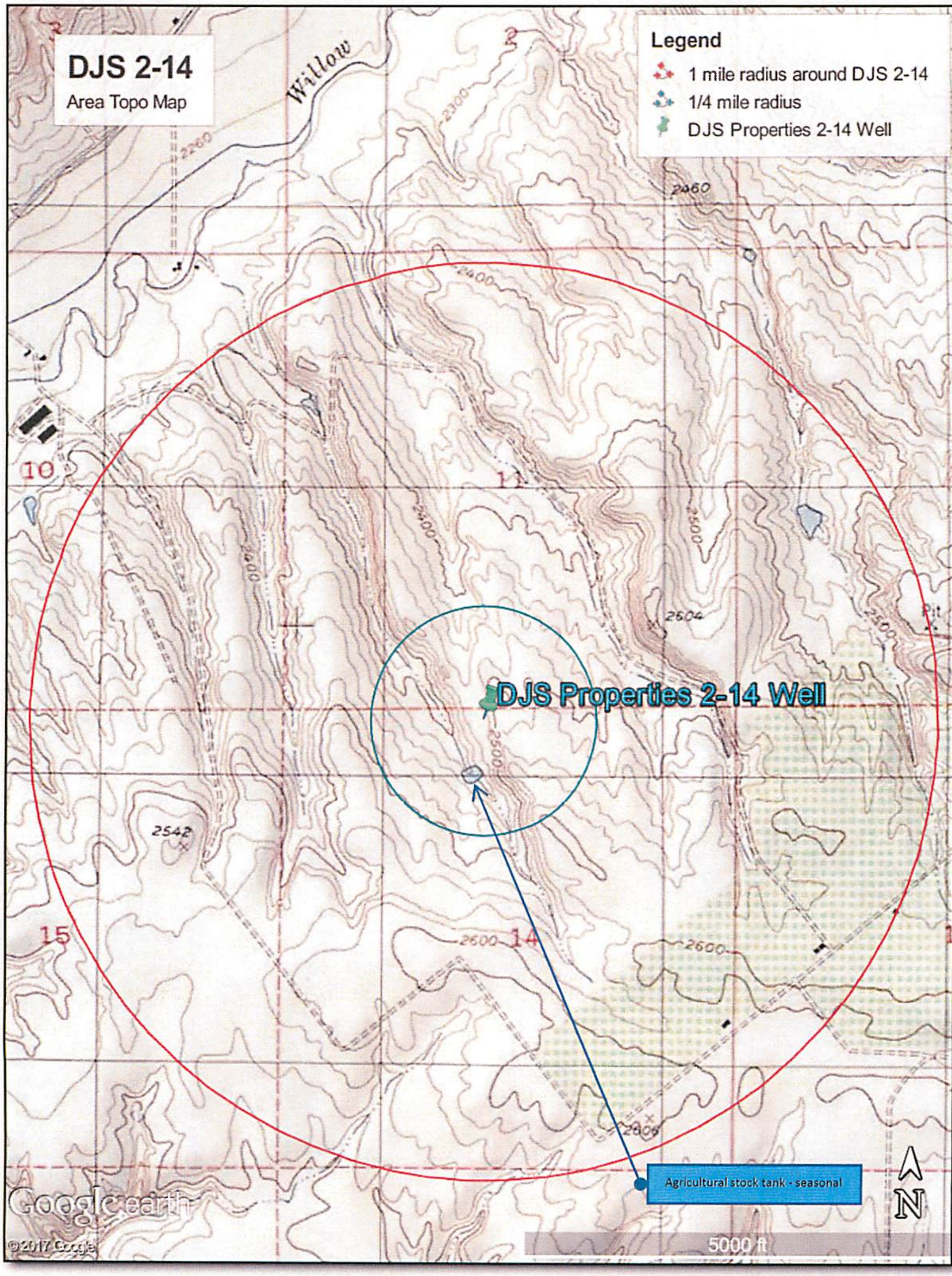
TABLE OF CONTENTS:

ATTACHMENT A

A. **AREA OF REVIEW -** 40 CFR 146.6 requires that the area of review (AOR) for each injection well or each field, project or area of the State be determined per either paragraph (a) or (b) of the regulation. Based on the remote location of the well and the lack of potential pathways which may cause the migration of the injection and/or formation fluid into an underground source of drinking water, Alta Mesa Services, LP has adopted the ¼ mile fixed radius to define the project AOR provided for in the regulations (i.e., 40 CFR 146.6(b)). Specifically, the AOR for this application encompasses a ¼ mile radius circle from the wellbore.

ATTACHMENT B

B. **MAPS OF WELL/AREA AND AREA OF REVIEW -** There are no notable wells, springs, water bodies, etc. within the 0.25 mile radius Area of Review.



ATTACHMENT C

C. **CORRECTIVE ACTION PLAN AND WELL DATA -** There are no wells within the area of review.

ATTACHMENT E

E. NAME AND DEPTH OF USDWs (CLASS II) - The Pierce Gulch Aquifer (USDW) is regionally present in the area around the DJS Properties 2-14 Well. In the DJS Properties 2-14, sand is present from the surface to a depth of approximately 250' TVD.

ATTACHMENT G

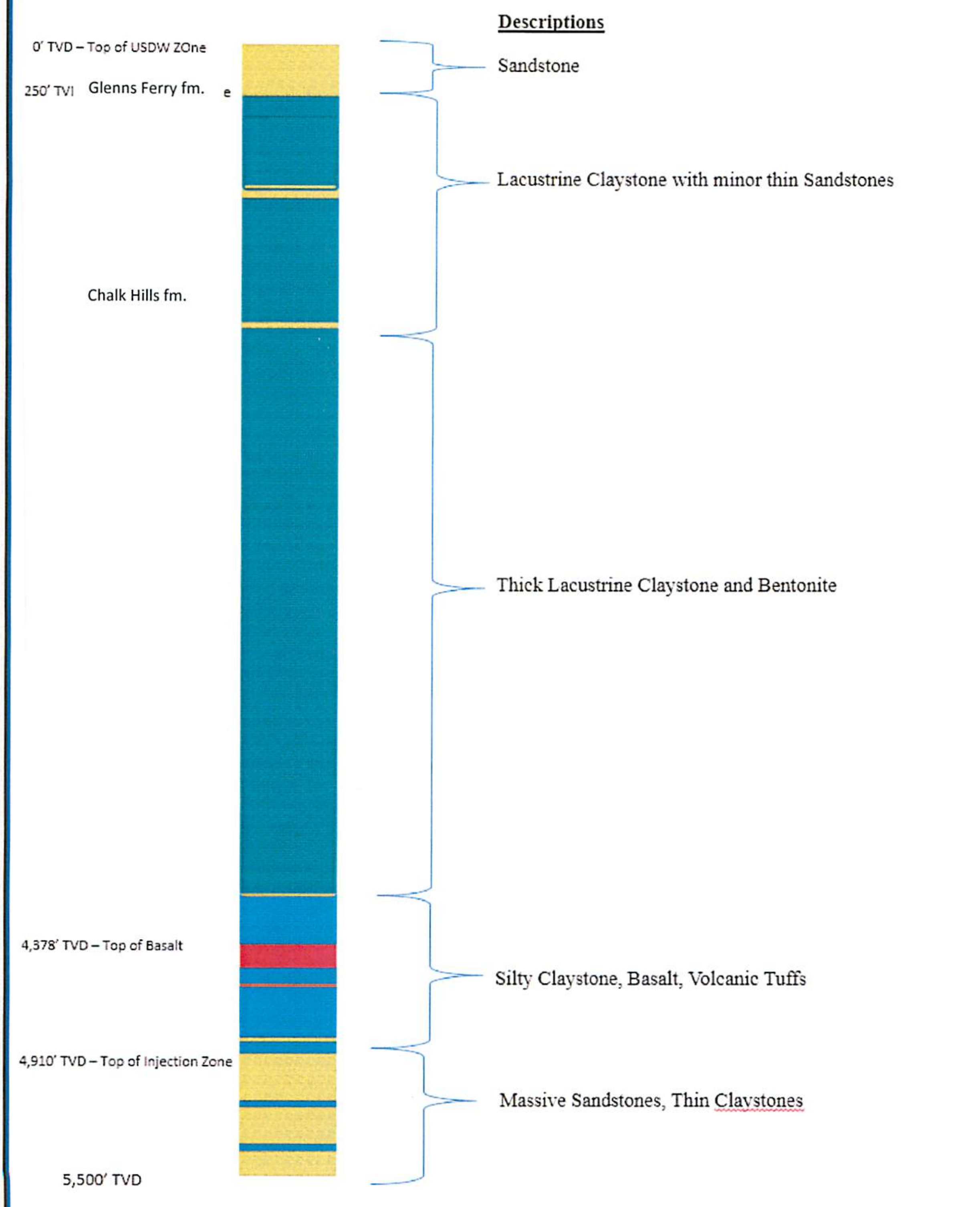
G. GEOLOGICAL DATA ON INJECTION AND CONFINING ZONES (Class II) - In the Alta Mesa Services, LP DJS Properties 2-14 the proposed injection zone is in a section of the Chalk Hills Formation, composed mainly of permeable quartz rich sandstone (See *Figure G-1* on next page). Per well log correlation the top of the injection zone occurs at 4,910' TVD and is 590' in gross thickness (5,500' Well TD). The confining zone is both the overlying Glenns Ferry Formation and the Chalk Hills formation. These formations are very widely distributed in this basin and are typically very impermeable claystones. (See *Figure G-2* on page 8). In the DJS Properties 2-14 well the Glenns Ferry formation (approx. 250'-1,600' TVD) is composed of highly impermeable lacustrine Claystone, as well as scattered arkosic sandstones. The Chalk Hills formation (approx. 1,600'-4,910'TVD) contains more lacustrine claystone, silicic volcanic ash, and basalt. Per well log correlation the top of the confinement zone is found at 250' TVD and is 4,660' thick. The Pierce Gulch Aquifer is found at the surface and is 250' thick. The Pierce Gulch aquifer is comprised of laminated sandstones interbedded with siltstones and clays.

Geology of the Injection Zone is described *on Figure G-3*, Pages 9-14.

Zone Function	Depth	Thickness	Geologic Name	Lithological Description
USDW Zone:	Surface – 250' TVD	250'	Pierce Gulch Aquifer	Sandstone, Claystone/Siltstone
Confining Zones:	250' TVD	1,350'	Glenns Ferry Formation	Lacustrine Claystone
	1,600' TVD- 4,910' TVD	3,310'	Chalk Hills Formation	Lacustrine, Claystone and Fluvial Sediments, Silicic Volcanic Ash and Basalt
Injection Zone:	4,910' TVD to TD 5,510'TVD	590'	Chalk Hills Formation	Quartz Rich Sandstone

The fracture pressure in the Chalk Hills Formation @5390' has been estimated at 3214 psi, based on a 12 ppg equivalent fluid density A leak off test will be run during the completion procedure to verify the fracture pressure of the confining zone as necessary. Dipole sonic data may become available prior to the completion construction procedure, and will be utilized instead of performing a leak off test to provide the capability to calculate Poisson's ratio and the associate frac gradients in the injection and confining zones. In addition, a step-rate test will be run prior to injection operations to determine actual fracture pressure in the injection zone. Injection operations will be controlled to always provide at least 50 psi below that pressure.

DJS 2-14 Composite Lithological Section ***Figure G-1***



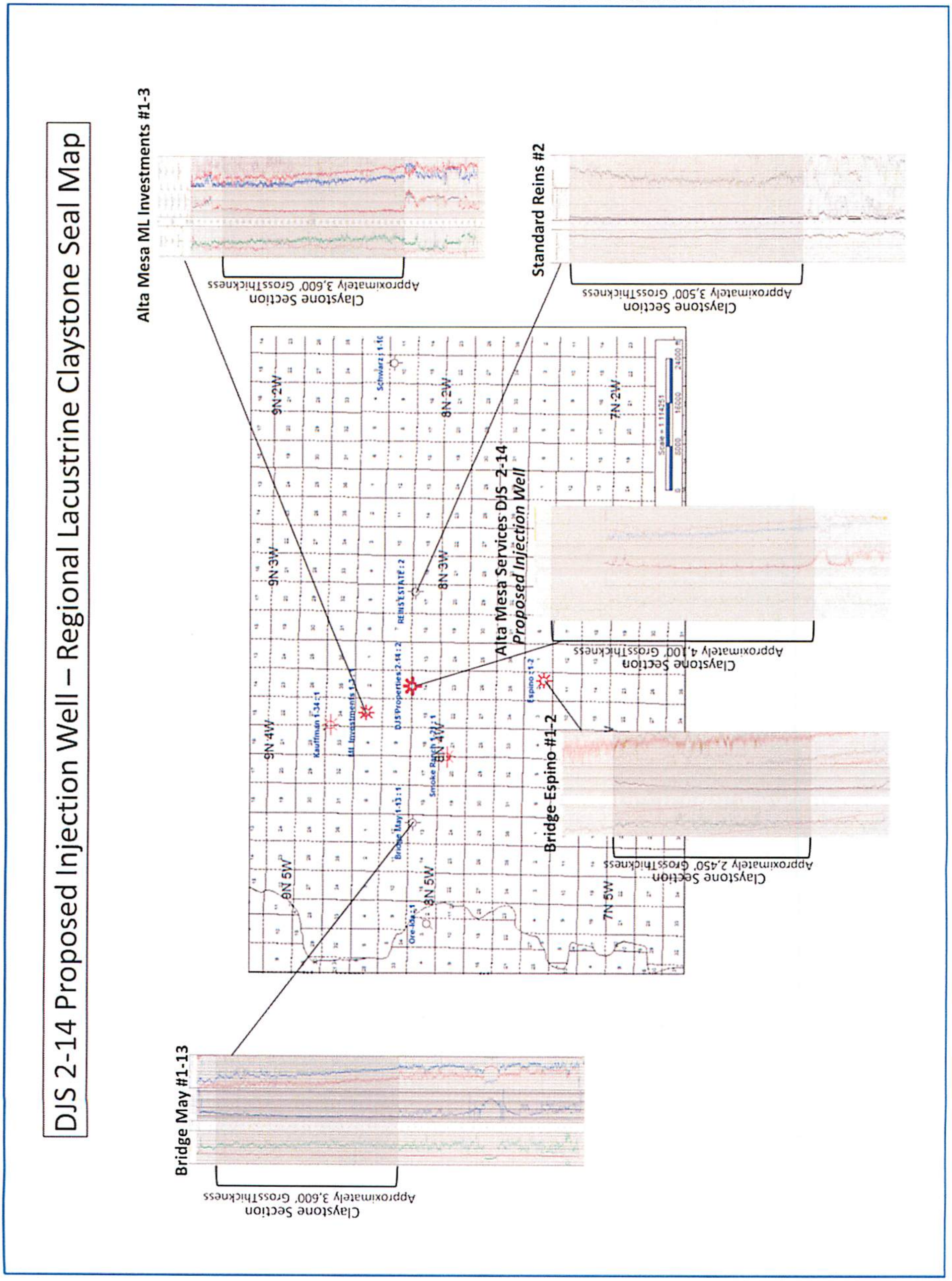

DJS 2-14 Proposed Injection Well – Regional Lacustrine Claystone Seal Map
Alta Mesa ML Investments #1-3
Claystone Section
Approximately 3,600' GrossThickness
Standard Reins #2
Claystone Section
Approximately 3,500' GrossThickness
Alta Mesa Services DJS 2-14
Proposed Injection Well
Claystone Section
Approximately 4,100' GrossThickness
Bridge Espino #1-2
Claystone Section
Approximately 2,450' GrossThickness
Bridge May #1-13
Claystone Section
Approximately 3,600' GrossThickness
9N 2W
9N 3W
9N 4W
9N 5W
8N 2W
8N 3W
8N 4W
8N 5W
7N 2W
7N 5W

Figure G-3

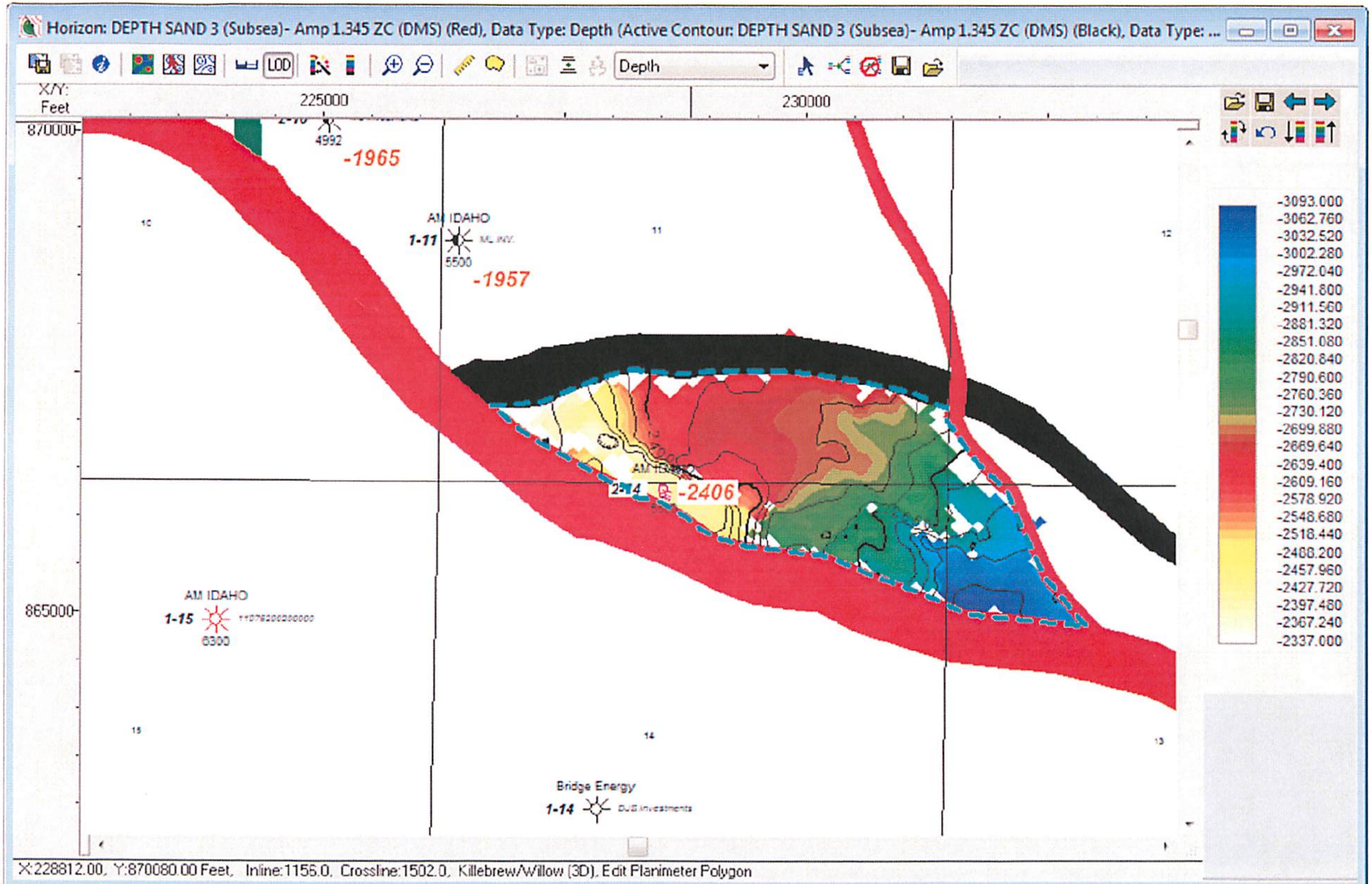
AM Idaho DJS #2-14 Proposed Disposal Well Geologic Setting

Township: 8 North - Range: 4 West - Section 14

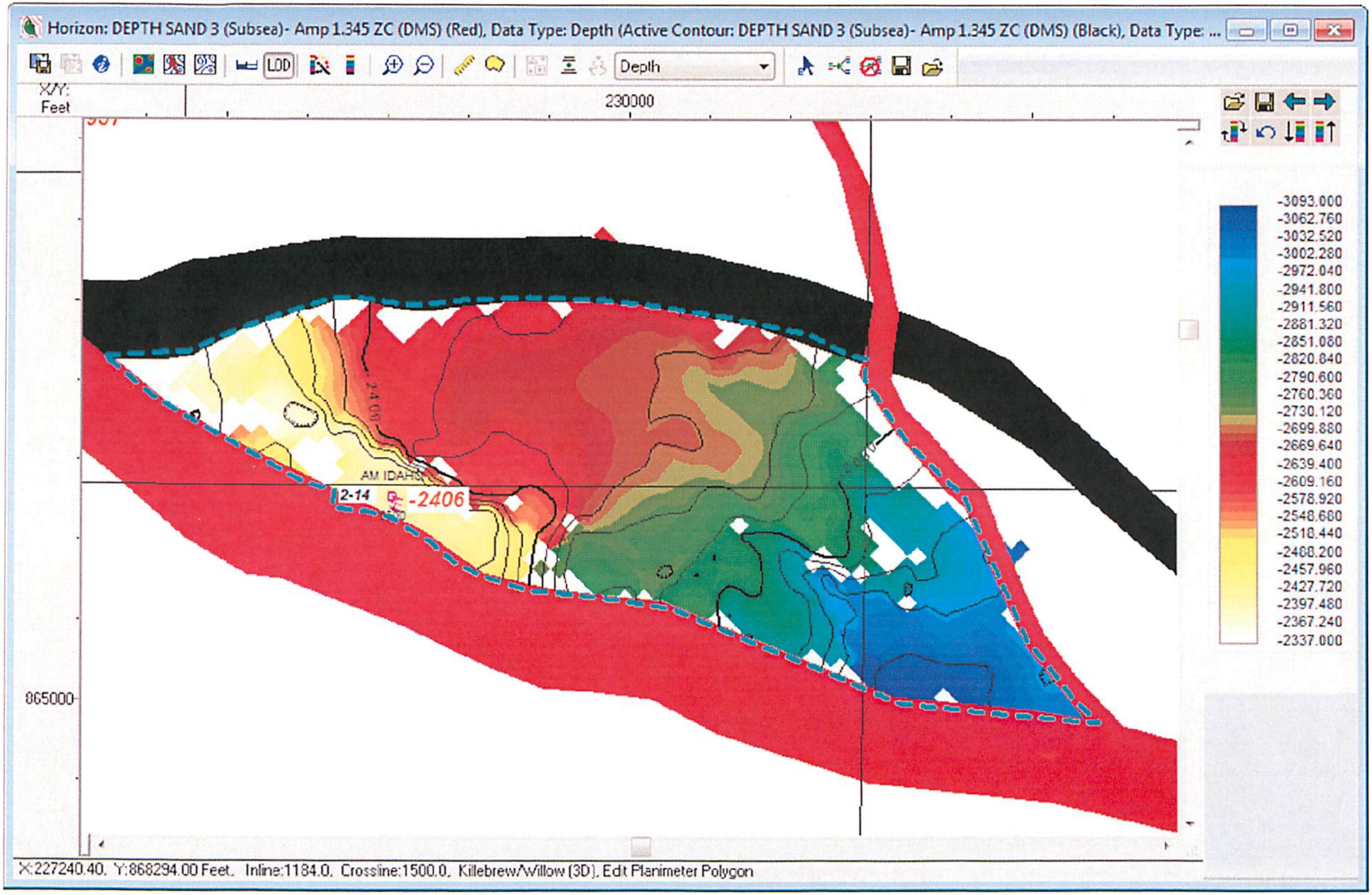
Payette County , Idaho

The following structure and Isopach maps were created from interpreting proprietary 3-D seismic data in conjunction with subsurface well control. Subsurface to seismic ties were done by making synthetic seismograms and verifying ties with seismic modelling. Due to the subsurface presence of basalts (very high acoustic impedance), the seismic to subsurface ties are excellent. The quality of the seismic data is very good to excellent, lending strong confidence to the interpretations Presented herein.

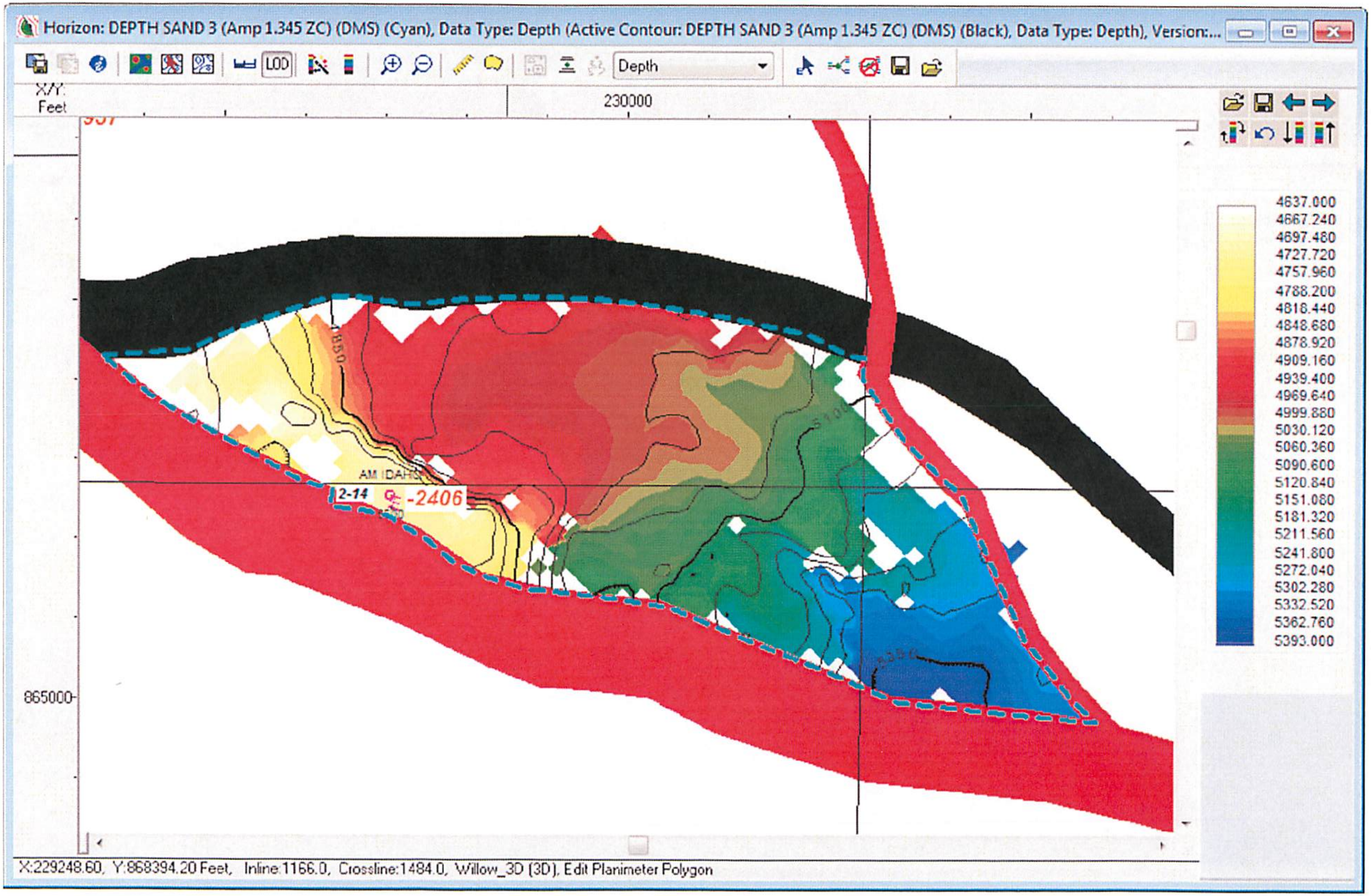
Structure Map (subsea): Top Sand 3
Proposed Injection Zone - Scale 1": 1000'



Structure Map (subsea): Top Sand 3
Proposed Injection Zone - Scale 1": 600'

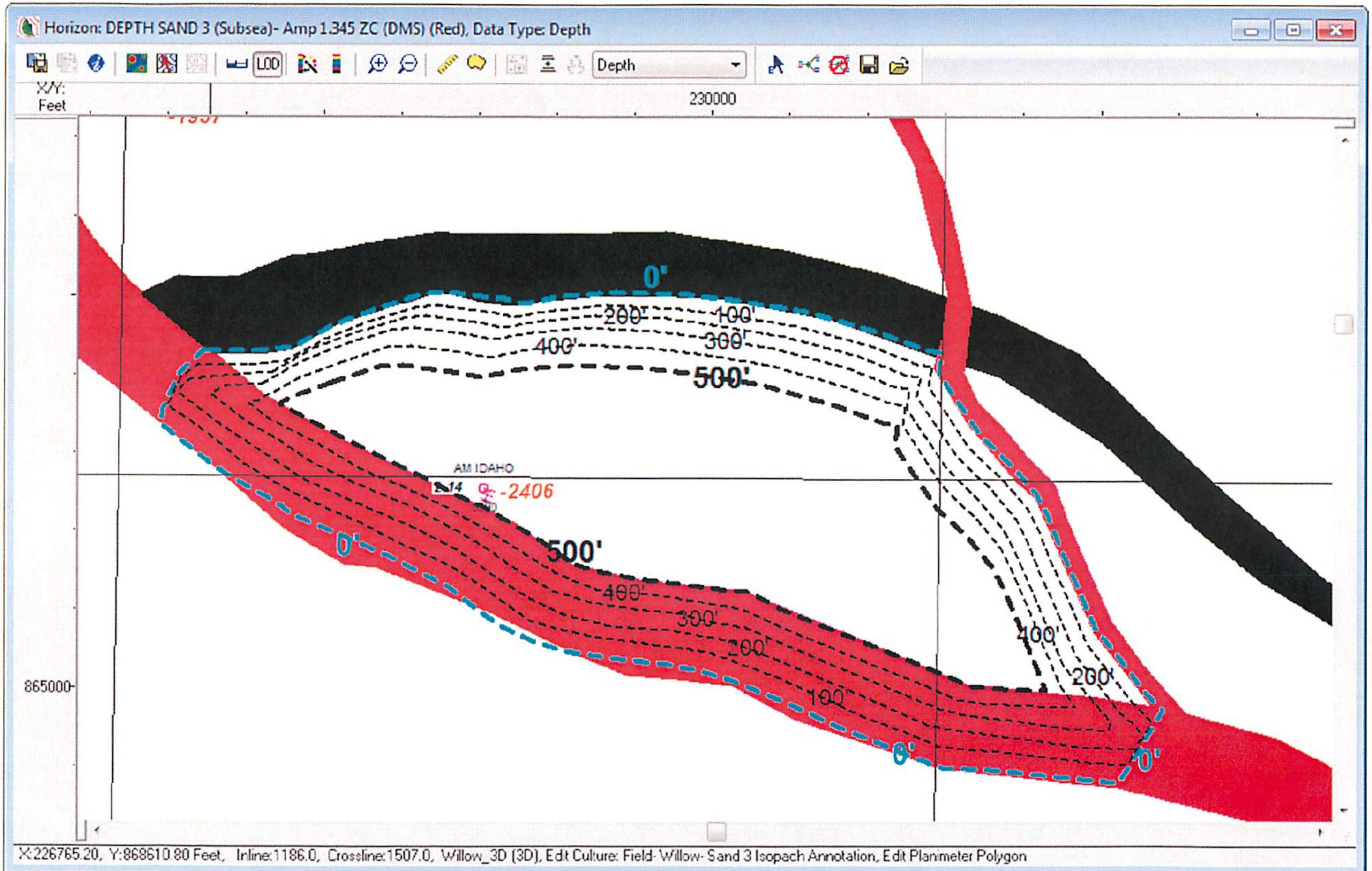


Structure Map (below Ground level datum of 2300' ASL): Top Sand 3 Proposed Injection Zone - Scale 1": 600'



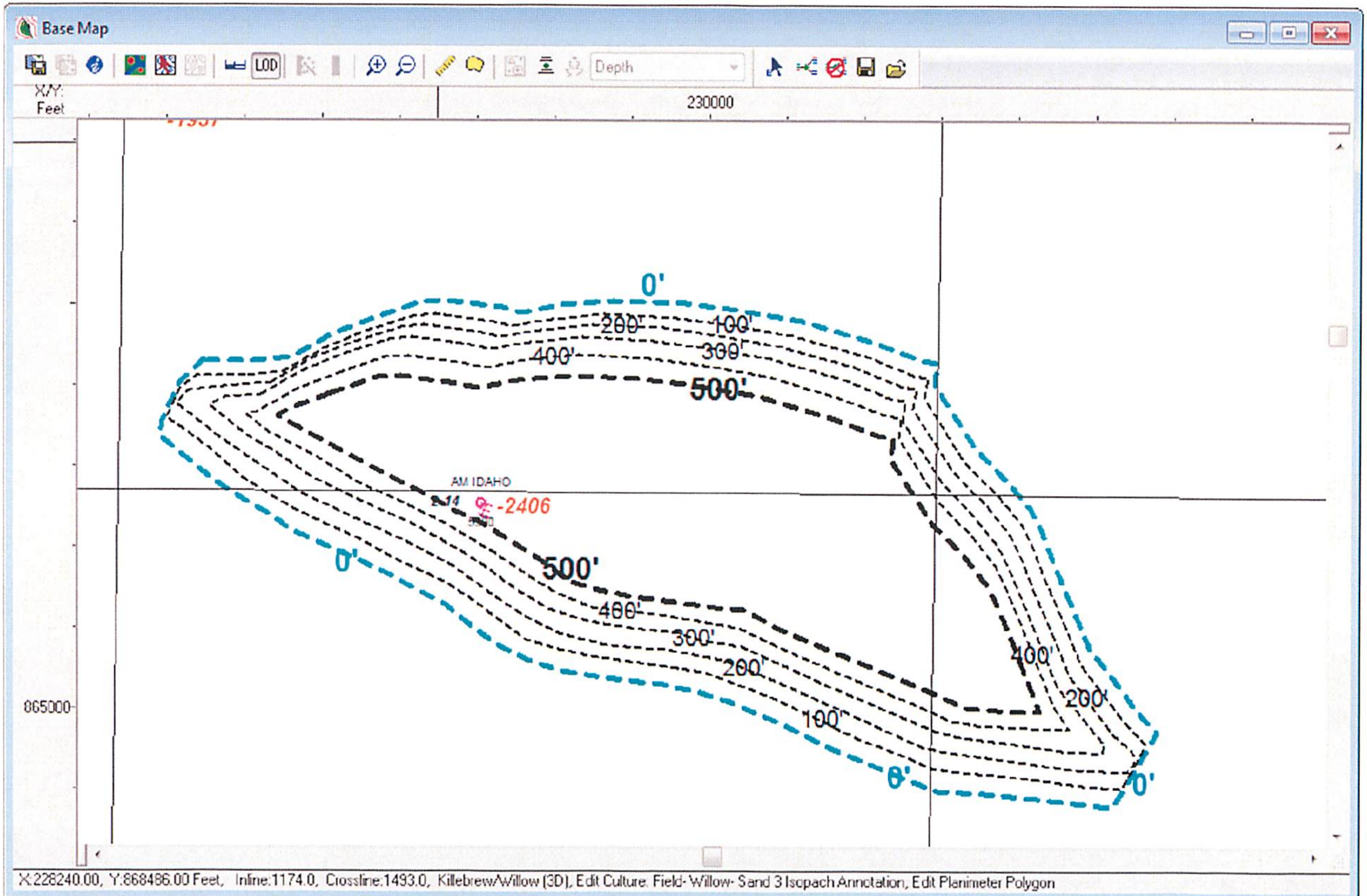
DMS 9/2017

Isopach Map of Sands 3,4,5 –showing Faulting
100' Contour Interval – Scale 1":600'



DMS 9/2017

Isopach Map of Sands 3,4, & 5
Scale 1":600'



DMS 9/2017

ATTACHMENT H

H. OPERATING DATA – The expected average daily rate and volume is 1000 barrels per day (BPD) / 1000 barrels (BBL). The maximum daily rate and volume is expected to be 2600 BWPD / 2600 BBL, based on a mechanistic hydraulic model of the wellbore tubulars and the reservoir characteristics.

The average and maximum surface injection pressures are estimated to be 199 (psig) and 628 psig, respectively, based on the hydraulic model.

The tubing / casing annulus will be filled with 8.8 lb/gallon potassium chloride water, supplemented with an appropriate corrosion inhibitor, biocide, and oxygen scavenger chemical additive package.

A step-rate test will be performed after initial commissioning of the injection facilities and well. The step rate test will allow the reservoir parting pressure to be determined and subsequent injection rates will be limited to maintain injection pressures at least 50 psi below this pressure.

The source of the injection fluid is produced water, associated with the oil and gas production operations of wells operated by Alta Mesa in the surrounding area. An analysis of the produced water is attached (See below - Wastewater Characteristics, EPA Methods). The produced water in this area is very low salinity and low TDS since the geologic sedimentary history is that of a lacustrine nature.

Wastewater Characteristics, EPA Methods

Alta Mesa	Date	Alkalinity (mg CaCO3/L)	Barium (mg/L)	BOD (mg/L)	Boron (mg/L)	Calcium (mg/L)	Chloride (mg/L)	COD (Mg/L)	Conductivity (µmhos/cm)	Cyanide (free) (mg/L)	Fluoride (mg/L)	Hexane extractable material (HEM) (mg/L)	Gross Alpha (pCi/L)	Gross Beta (pCi/L)	Iron (mg/L)	Manganese (mg/L)	Mercury-CVAFS (mg/L)	NO3/N (mg/L)	Potassium...(mg/L)	Radium 226 (pCi/L)	Radium 228 (pCi/L)	Methanol (mg/L)	Silica (as SiO2) (mg/L)	Silicon (mg/L)	Sodium (mg/L)	TDS (mg/L)	TSS (mg/L)	Strontium (mg/L)	Sulfate (mg/L)	MBAS (mg/L)	Turbidity (NTU)
WP4-1	March 13, 2017	525	0.315	>38.0	7.61	70.7	874	277	4320	0.0131	1.89	7.2	0.120 +/- 5.49	592 +/- 31.8	2.54	0.240	4.31	0.477		0.516 +/- 0.292	0.972 +/- 0.220	9470	50.9	23.8	404	2910	12.4	2.15	47.3	0.137	9.66
Tank Battery	May 23, 2016	419	0.144		6.93	16.1	143		1700	0.0197	7.77		0.013 +/- 1.62	20.4 +/- 4.00	2.33		0.476		40.8	0.05 +/- 0.10	-0.136 +/- 0.555	667	77.5	36.2	314	1420	15.7	0.508	9.58	0.166	48.5

Wastewater Characteristics, EPA Methods

Alta Mesa	Date	Diesel (mg/L)	Lube Oil (mg/L)	Gasoline (mg/L)	1,2,4-Trimethylbenzene (ug/L)	1,3,5-Trimethylbenzene (ug/L)	Acetone (ug/L)	Benzene (ug/L)	Ethylbenzene (ug/L)	Isopropylbenzene (ug/L)	m+p-Xylene (ug/L)	Methyl ethyl ketone (MEK) (ug/L)	Naphthalene (ug/L)	n-Propylbenzene (ug/L)	o-Xyllene (ug/L)	Toluene (ug/L)	1-Methylnaphthalene (ug/L)	2,4-Dimethylphenol (ug/L)	2-Methylnaphthalene (ug/L)	2-Meltylphenol (ug/L)	3+4--Meltylphenol (ug/L)	Bis(2-Ethylhexyl)phthalate (ug/L)	Fluorene (ug/L)	Naphthalene (ug/L)	Phenanthrene (ug/L)	Phenol (ug/L)	Pyrene (ug/L)
WP5-1 3:00 p.m.	March 13, 2017	438		80.2	178	103	1390	20000	657	41.4	2500	587	44.2	37.4	729	11500											
WP4-1 2:30 p.m.	March 13, 2017	43.1		71.3	182	103	1380	19400	695	40.0	2710	580	48.4	34.8	805	11100	28.4	581	57.0	1020	1590	4.24		74.1		2200	
Tank Battery	May 23, 2016	32.3	7.48	38.4	257	127	13500	24800	1080		4170		59.2		1150	17800	116	571	245	1330	1880	22.3	16.7	265	48.5	3270	21.3

A calculation of the expected injection reservoir capacity was performed. This calculation assumes a confined reservoir pore space as defined by the isopach of the injection zone in a fault block bounded on 3 sides by faults (see Attachment G for details). The bulk volume is calculated by determining the area of each isopach interval and using the average of the areas to calculate the total bulk injection reservoir volume. A porosity of 23% is estimated from open hole wireline logs for the injection interval. Water saturation is estimated at 80%, with a complimentary 20% gas saturation. This is based on the swab test of the 5380-5390 perforations, where gas blows were experienced and a water sample showed the presence of Benzene and other VOC's naturally associated with water associated with hydrocarbon reservoirs. The average net reservoir to bulk thickness ratio is estimated at 90% from a review of the mud log for this interval. The pore space is estimated to contain 152 million reservoir barrels. Under confined injection, the water, gas, and pore space will compress and expand respectively to allow for water influx as pore pressure increases. The maximum allowable pressure is defined by staying 10% below fracture pressure. Fracture pressure is estimated to be equivalent to a 12 lb/gallon gradient (3214 psi at 5150'). Note that the actual parting pressure will be well defined upon completion of the well by the execution of a step rate test. The original pressure is estimated at a pressure equal to an 8.6 lb/gallon equivalent pressure gradient (2276 psi at 5150'). The maximum allowable pressure used in the calculation of Injection Zone Capacity is 90% of the fracture pressure (90% of 3214 = 2892 psi). This provides for an allowable increase in the reservoir pressure of 616 psi (2892-2276). Water, gas, and pore space compressibility's are estimated using standard oil and gas industry correlations. Based on the original reservoir volume, along with the allowable pressure increase and the sum of the compressibilities, it is estimated that a total of 7,773 thousand reservoir barrels can be injected into this space before the pressure limit is reached. This equates to 7,368 thousand stock tank barrels based on a water reservoir volume factor of 1.055 RB/STB.

Calculation of Confined Injection Zone Capacity

DJS Properties #2-14 Injection Zone

Calculation of Reservoir Volumes:

Porosity	0.23	fraction	from well log
Sw	0.80	fraction	water saturation - evidence of gas in swab testing and water analysis
Sg	0.20	fraction	gas saturation - evidence of gas in zone from swab testing - residual gas
Gross Volume	94,700	acre-ft	from planimetry calculations below
Net/Gross Ratio	0.90	fraction	from well logs
Pore Volume	19,603	acre-ft	

Reservoir Isopach Area Planimeter Readings:

CONTOUR LINE VALUE	AREA > (acres)	RATIO OF AREAS	DELTA CONTOUR (ft)	DELTA VOLUME (acre-ft)	
0	269.00				
100	234.00	0.8699	100	25,150.0	
200	205.00	0.8761	100	21,950.0	
300	173.00	0.8439	100	18,900.0	
400	144.00	0.8324	100	15,850.0	
500	113.00	0.7847	100	12,850.0	
		TOTAL ==>		94,700.0	acre-ft - gross bulk reservoir volume

Injection Zone Capacity

Item	Value	Units	Comments - notes
Datum Depth:	5150	ft, BGL	average depth of injection zone
Average Temperature	251	deg F	ML Investments 1-3 production log
Initial Pressure:	2276	psi	8.6 ppg equivalent pore pressure at datum depth
Fracture Pressure:	3214	psi	12 ppg equivalent pore pressure at datum depth
Maximum Allowable Pressure	2892	psi	90% of fracture pressure
Maximum Pressure Increase (dP)	616	psi	maximum allowable pressure less initial pressure
Average Pressure	2584	psi	average of initial pressure and maximum allowable pressure
Water Salinity	750	ppm Cl	estimated average
Water Compressibility	3.48E-06	1/psi	Osif's Correlation
Gas Compressibility	3.87E-04	1/psi	Meehan et al, Gas gravity = 0.65 from ML Investments 1-10 Well
Rock pore volume compressibility	3.50E-06	1/PSI	Hall's Correlation
Reservoir Water Volume Initial	15,682	acre-ft	Pore Volume * Sw
Reservoir Water Volume Initial	121,663,439	RBbls	Pore Volume * Sw
Reservoir Water Volume Compression	261,022	RBbls	dP * water compressibility* initial water volume
Reservoir Gas Space Volume Initial	3,921	acre-ft	Pore Volume * Sg
Reservoir Gas Space Volume Initial	30,415,860	RBbls	Pore Volume * Sg
Gas Pore Space Compression	7,250,191	RBbls	dP * gas compressibility * initial gas volume
Pore Space Volume Increase	262,281	Rbbls	dP * pore space compressibility
Total Pore Space volume increase	7,773,494	RBbls	sum of water, gas, and pore space compression
Bw (water formation volume factor):	1.055	RBbl/STBbl	McCain's Correlation
Total Stock Tank Barrels Capacity	**7,368,241**	**STBbls**	adjust to surface conditions by dividing by water formation volume factor (Bw)

Stock tank barrels are measured at atmospheric pressure and 60 degrees F.

ATTACHMENT I

I. **FORMATION TESTING PROGRAM –** A step rate test will be run at the time of initial completion to determine the actual parting pressure of the injection interval after the packers and tubing is installed. The water used in this test will be from the same source as the proposed source water. Surface injection pressure and injection rates will be measured during the step rate test. The determination of bottom hole parting pressure will be indicated by a departure in the injectivity ratio (dRate/dPressure) when the parting pressure is exceeded. The pressure defined by the intersection of the slopes of the injectivity data below and above parting pressure will define the surface maximum injection pressure. All injection operations will be held to 50 psi or more below this pressure to assure that fracturing of the injection interval does not occur. Bottom hole pressures will be calculated based on the density of the fluid being injected, along with surface pressure measurements. Water samples were collected and analyzed on the interval at 5380-90' and is believed to be representative of the entire interval being proposed for injection.

ATTACHMENT J

J. **STIMULATION PROGRAM –** No stimulation program is expected to be needed. The sandstone in this area has good permeability and the unstimulated injectivity should be sufficient.

ATTACHMENT K

K. **INJECTION PROCEDURES** – Individual monitoring of the DJS Properties #2-14 is planned. Gauges will be installed at the wellsite, and a flow meter will be installed at the pump station. Casing pressure will be maintained at 0 psig. If any pressure is noted on the annulus between the tubing and the production casing, injection will immediately be halted. Injection will not be resumed until the source of the pressure has been identified and repaired. Injection pressure at the wellhead on the tubing will be maintained 50 psi below parting pressure. An initial step-rate test will be performed to determine parting pressure to beginning injection operation. Produced water will be gathered into stock tanks and through additional settling and filtration vessels, as necessary to assure clean water is pumped downhole. A polish filter will be installed at the wellhead to catch any solids that make their way to the wellhead. An injection pump will be located near the stock tanks to pressurize the water and transport the water via flowline to the wellhead. A pressure relief valve will be installed on the pump to prevent excessive pressure from being placed on the flowline. This relief valve will be piped back to the source tanks or to the intake of the pump. Source water will be provided by the producing wells. The flowline will be buried below grade to avoid freezing issues. The portion of the flowline above grade will have insulation and heat tracing to avoid freezing during winter operations. The flowline easement and wellhead will be visually inspected daily (within reason, due to considerations of weather and other force majeure) by field operating personnel.

ATTACHMENT L

L. CONSTRUCTION PROCEDURES –

Historical:

Spud well 9/11/2014. Surface hole was drilled with 12 ¼" bit to 1093'. 9 5/8" 40 lb/ft K-55 LTC casing was then set at 1082' and was cemented back to surface. An 8.75" hole was drilled to 5,500' and production casing was then run and cemented (7" 26 lb/ft J-55 LTC casing with bow spring centralizers). A top down cement job was then performed on the 7" casing, to provide cement coverage between the production casing and the surface casing down below the shoe of the surface casing. The prospective hydrocarbon intervals were then tested by perforating and flow/swab tested each of 5 intervals between 5390' and 4306'. All tested non-commercial. The first zone at 5380-5390' did have good gas blows during swabbing. Cement retainers or bridge plugs were set between intervals during the testing operations which proceded from the bottom to the top interval, and was also placed above last interval after testing. Testing was completed by 11/3/2014. See attached wellbore diagram.

Planned Injection Completion Construction:

1. Move in workover rig.
2. Pressure test casing above bridge plug at 4,294'
3. Drill out top plug and cement squeeze perforations in the interval 4,306' – 4,374'.
4. Drill out squeeze and test same. Re-squeeze as necessary.
5. Drill out plugs and retainers to below float collar to 5,450'. If dipole sonic data is not available, run leak-off test prior in the Confining Zone to verify fracture gradient in the Confining Zone.
6. Add perforations in interval 5390 – 5410'.
7. Run tubing, packer and isolation packer to 4880' and set upper packer at 4200'. (see attached wellbore diagram)
8. Hang off tubing and install wellhead assembly.
9. Run step rate test with actual produced water to determine parting pressure and injectivity.
10. Connect gauges and filter pod, flowline, pump, and commission injection system.

ATTACHMENT M

M. **CONSTRUCTION DETAILS** – See the following pages for wellbore schematics.

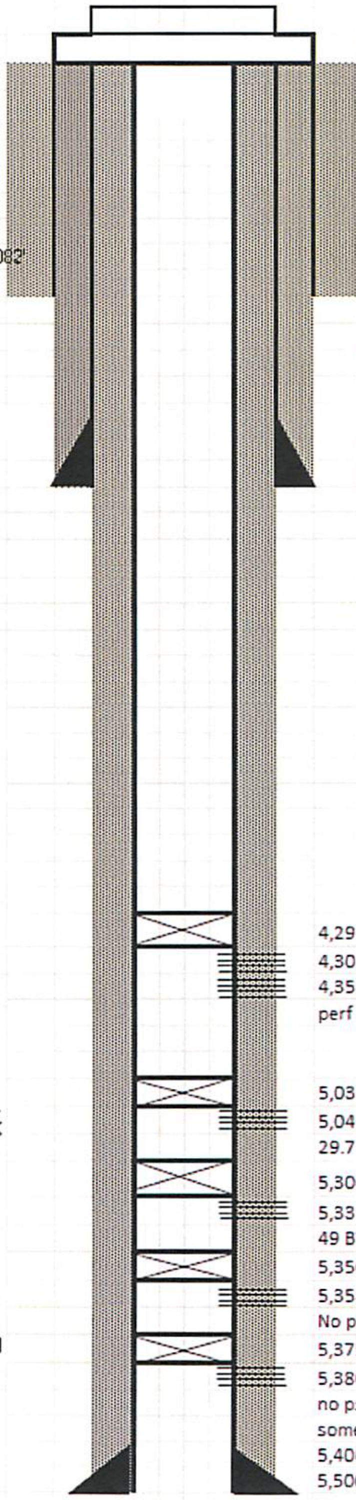
Alta Mesa Holdings **DJS Properties 2-14**

Willow Field - Payett County, ID

Current Wellbore Diagram as of 11/3/2014 - Well Temporarily Abandoned

Spud 9/12/2014 T&A'd 11/3/2014

GL Elevation above MSL: 2,488'



Casing & Cement

Conductor : 13 3/8 OD, @ 80'

Surface: 24 jts, 9-5/8" OD, 8.83 ID,40#, K-55 @ 1,082'
215 Sacks, (144 Bbls) Type III Cement + Slurrylite 50 Pps, 20% MS-500, 5% HW Gypsum, 5% Salt B.W.O.W., 0.75% TSFL-180, 0.25% CFL-300, 3.77 ft3/sk, 14.22 gal/sk, 10.4 ppg. Followed by 70 sacks, (17 Bbbls) Type III Cement + 5% Salt B.W.O.W., 1.36 ft3/sk, 6.42 gal/sk, 14.8 ppg.

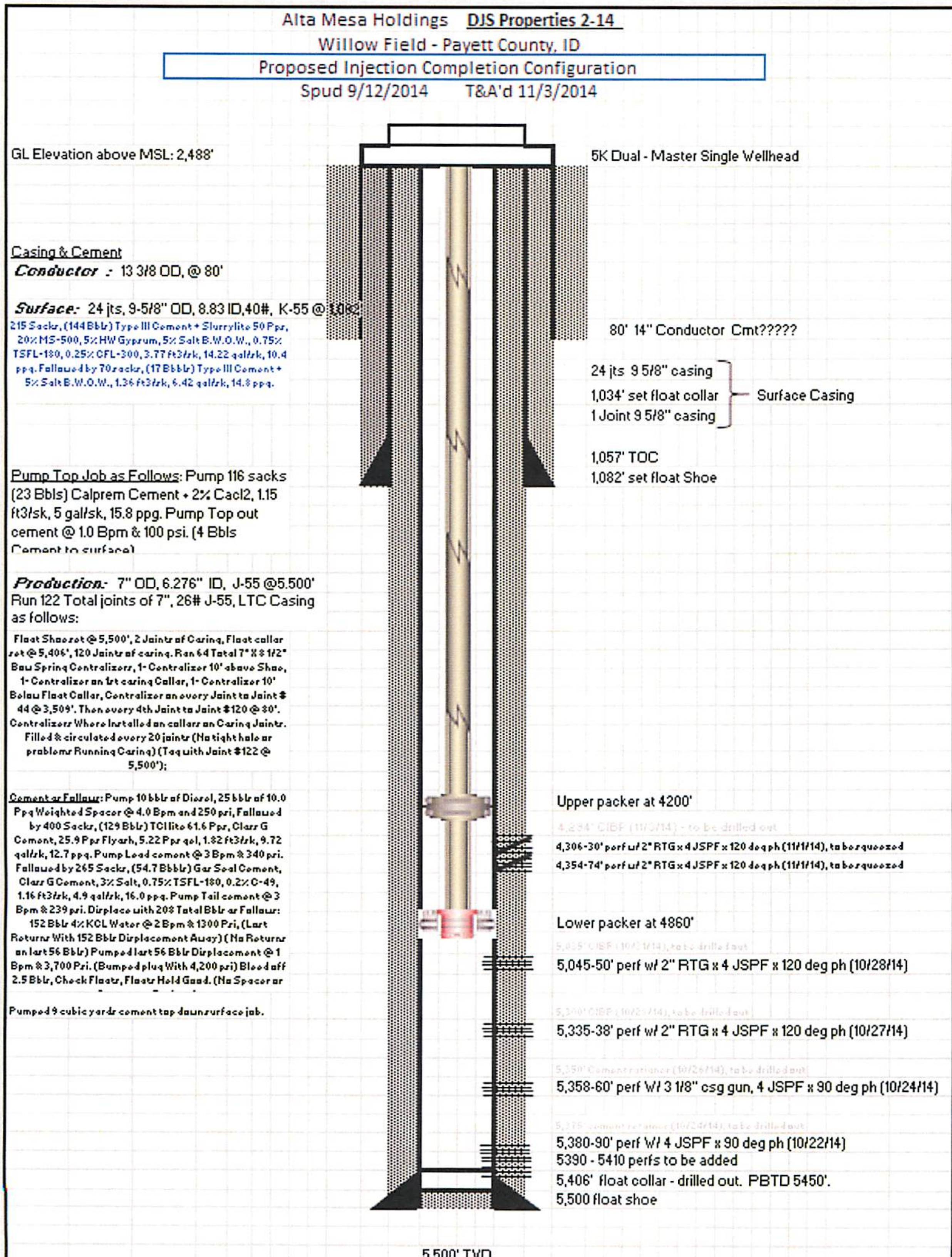
Pump Top Job as Follows: Pump 116 sacks (23 Bbls) Calprem Cement + 2% Cacl2, 1.15 ft3/sk, 5 gal/sk, 15.8 ppg. Pump Top out cement @ 1.0 Bpm & 100 psi. (4 Bbls Cement to surface)

Production: 7" OD, 6.276" ID, J-55 @5.500'
Run 122 Total joints of 7", 26# J-55, LTC Casing as follows:
Float Shoe set @ 5,500', 2 Joints of Casing, Float collar set @ 5,406', 120 Joints of casing. Ran 64 Total 7" X 8 1/2" Bow Spring Centralizers, 1- Centralizer 10' above Shoe, 1- Centralizer on 1st casing Collar, 1- Centralizer 10' Below Float Collar, Centralizer on every Joint to Joint # 44 @ 3,509'. Then every 4th Joint to Joint #120 @ 80'. Centralizers Where Installed on collars on Casing Joints. Filled & circulated every 20 joints (No tight hole or problems Running Casing) (Tag with Joint #122 @ 5,500');

Cement as Follows: Pump 10 bbls of Diesel, 25 bbls of 10.0 Ppg Weighted Spacer @ 4.0 Bpm and 250 psi, Followed by 400 Sacks, (129 Bbls) TCI lite 61.6 Pps, Class G Cement, 25.9 Pps Flyash, 5.22 Pps gel, 1.82 ft3/sk, 9.72 gal/sk, 12.7 ppg. Pump Lead cement @ 3 Bpm & 340 psi. Followed by 265 Sacks, (54.7 Bbbls) Gas Seal Cement, Class G Cement, 3% Salt, 0.75% TSFL-180, 0.2% C-49, 1.16 ft3/sk, 4.9 gal/sk, 16.0 ppg. Pump Tail cement @ 3 Bpm & 239 psi. Displace with 208 Total Bbls as Follows: 152 Bbls 4% KCL Water @ 2 Bpm & 1300 Psi, (Lost Returns With 152 Bbls Displacement Away) (No Returns on last 56 Bbls) Pumped last 56 Bbls Displacement @ 1 Bpm & 3,700 Psi. (Bumped plug With 4,200 psi) Bleed off 2.5 Bbls, Check Floats, Floats Held Good. (No Spacer or Cement to Surface)

Pumped 9 cubic yards cement top-down job.

Well Name & No.: DJS Properties 2-14	Field: Willow
County: Payette	State: Idaho
Total Depth (MD): 5,500'	(TVD) 5,500'
Date Completed: T&A on 11/3/2014	Latest Revision Date: 2/3/2015



Well Name & No.: DJS Properties 2-14	Field: Willow
County: Payette	State: Idaho
Total Depth (MD): 5,500'	(TVD) 5,500'
Date Completed: T&A on 11/3/2014	Latest Revision Date: 2/3/2015

ATTACHMENT O

O. PLANS FOR WELL FAILURES -- The potential areas of concern for this type well are three points: 1) packer to casing seal, 2) tubing connections or tubing body leak, or 3) tubing hanger seals. For any of these components a leak will be indicated by the existence of pressure on the tubing / casing annulus pressure gauge. These type of leaks will be contained within the wellbore envelope. If pressure is observed on the casing gauge, injection operations will immediately cease. The wellhead will be isolated by closing in all wellhead valves and the pump and flowline valves will be closed. The tubing hanger seals will be inspected using a wellhead service company technician who can pressure test the seals for leaks. After this testing is done, a workover rig will be utilized to repair the leaking seals or to pull the tubing and packer so that they can be inspected for leaks and replaced as necessary. Injection will not be reinstated until the leak is repaired and the annulus is pressure tested to verify integrity of the injection components.

Mechanical integrity tests will be run periodically according to permit requirements by applying pressure on the annulus between the production casing and the tubing. This test is designed to detect any production casing weakness. If any leaks are noted, injection operations will not resume until the leak is located and repaired.

ATTACHMENT Q

Q. PLUGGING AND ABANDONMENT PLAN – See proposed Post-Injection Plugging Configuration wellbore diagram and associated EPA Form 7520-14 which details the proposed plugging and abandonment plan for this well.

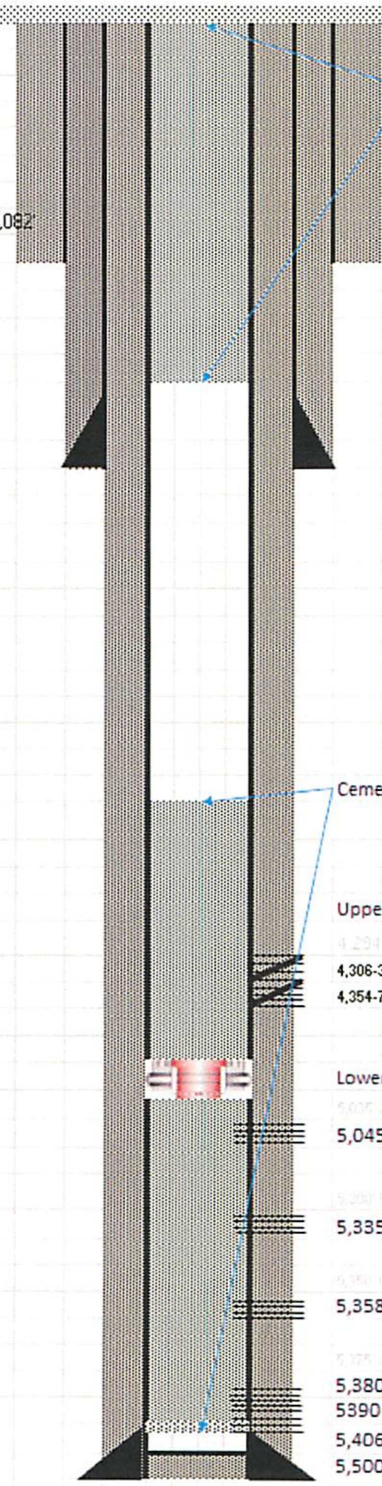
Alta Mesa Holdings **DJS Properties 2-14**

Willow Field - Payett County, ID

Proposed post-injection plugging configuration

Spud 9/12/2014 T&A'd 11/3/2014

GL Elevation above MSL: 2,488'



Casing & Cement

Conductor : 13 3/8 OD, @ 80'

Surface: 24 jts, 9-5/8" OD, 8.83 ID,40#, K-55 @ 1,082'

215 Sacks, (144 Bbls) Type III Cement + Slurrylite 50 Pps, 20% MS-500, 5% HW Gypsum, 5% Salt B.W.O.W., 0.75% TSFL-180, 0.25% CFL-300, 3.77 ft3/sk, 14.22 gal/sk, 10.4 ppg. Followed by 70 sacks, (17 Bbbls) Type III Cement + 5% Salt B.W.O.W., 1.36 ft3/sk, 6.42 gal/sk, 14.8 ppg.

Pump Top Job as Follows: Pump 116 sacks (23 Bbls) Calprem Cement + 2% Cacl2, 1.15 ft3/sk, 5 gal/sk, 15.8 ppg. Pump Top out cement @ 1.0 Bpm & 100 psi. (4 Bbls Cement to surface)

Production: 7" OD, 6.276" ID, J-55 @5.500'

Run 122 Total joints of 7", 26# J-55, LTC Casing as follows:

Float Shoe set @ 5,500', 2 Joints of Casing, Float collar set @ 5,406', 120 Joints of casing. Ran 64 Total 7" X 8 1/2" Bow Spring Centralizers, 1- Centralizer 10' above Shoe, 1- Centralizer on 1st casing Collar, 1- Centralizer 10' Below Float Collar, Centralizer on every Joint to Joint # 44 @ 3,509'. Then every 4th Joint to Joint #120 @ 80'. Centralizers Where Installed on collars on Casing Joints. Filled & circulated every 20 joints (No tight hole or problems Running Casing) (Tag with Joint #122 @ 5,500');

Cement as Follows: Pump 10 bbls of Diesel, 25 bbls of 10.0 Ppg Weighted Spacer @ 4.0 Bpm and 250 psi, Followed by 400 Sacks, (129 Bbls) TCI lite 61.6 Pps, Class G Cement, 25.9 Pps Flyash, 5.22 Pps gel, 1.82 ft3/sk, 9.72 gal/sk, 12.7 ppg. Pump Lead cement @ 3 Bpm & 340 psi. Followed by 265 Sacks, (54.7 Bbbls) Gas Seal Cement, Class G Cement, 3% Salt, 0.75% TSFL-180, 0.2% C-49, 1.16 ft3/sk, 4.9 gal/sk, 16.0 ppg. Pump Tail cement @ 3 Bpm & 239 psi. Displace with 208 Total Bbls as Follows: 152 Bbls 4% KCL Water @ 2 Bpm & 1300 Psi, (Lost Returns With 152 Bbls Displacement Away) (No Returns on last 56 Bbls) Pumped last 56 Bbls Displacement @ 1 Bpm & 3,700 Psi. (Bumped plug With 4,200 psi) Bleed off 2.5 Bbls, Check Floats, Floats Held Good. (No Spacer or Cement

Pumped 9 cubic yards cement top down surface job.

Well Name & No.: DJS Properties 2-14	Field: Willow
County: Payette	State: Idaho
Total Depth (MD): 5,500'	(TVD) 5,500'
Date Completed: T&A on 11/3/2014	Latest Revision Date: 2/3/2015

OMB No. 2040-0042 Approval Expires 12/31/2018

EPA

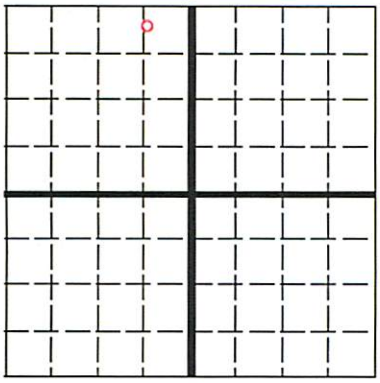
United States Environmental Protection Agency
Washington, DC 20460

PLUGGING AND ABANDONMENT PLAN

Name and Address of Facility	Name and Address of Owner/Operator
DJS Properties # 2-14	Alta Mesa Services, LP, 15021 Katy Fwy, St 400, Houston, TX 77094

Locate Well and Outline Unit on Section Plat - 640 Acres

N

W  E

S

State	County	Permit Number
Idaho	Payette	LU600120

Surface Location Description

NE 1/4 of NE 1/4 of NE 1/4 of N 1/4 of Section 14 Township 8N Range 4W

Locate well in two directions from nearest lines of quarter section and drilling unit

Surface
Location 95 ft. frm (N/S) N Line of quarter section
and 2315 ft. from (E/W) W Line of quarter section.

TYPE OF AUTHORIZATION

- ✓ Individual Permit
- ☐ Area Permit
- ☐ Rule

Number of Wells 1

WELL ACTIVITY

- ☐ CLASS I
- ✓ CLASS II
  - ✓ Brine Disposal
  - ☐ Enhanced Recovery
  - ☐ Hydrocarbon Storage
- ☐ CLASS III

Lease Name DJS Properties

Well Number 2-14

CASING AND TUBING RECORD AFTER PLUGGING

SIZE	WT (LB/FT)	TO BE PUT IN WELL (FT)	TO BE LEFT IN WELL (FT)	HOLE SIZE
7"	26	5500	5500	8.75"
9.625"	40	1082	1082	12.75
13.375"	61	120	120	17.5"

METHOD OF EMPLACEMENT OF CEMENT PLUGS

- ✓ The Balance Method
- ☐ The Dump Bailer Method
- ☐ The Two-Plug Method
- ✓ Other

CEMENTING TO PLUG AND ABANDON DATA:	PLUG #1	PLUG #2	PLUG #3	PLUG #4	PLUG #5	PLUG #6	PLUG #7
Size of Hole or Pipe in which Plug Will Be Placed (inche	7"	7"					
Depth to Bottom of Tubing or Drill Pipe (ft	5410	750					
Sacks of Cement To Be Used (each plug)	TBD	TBD					
Slurry Volume To Be Pumped (cu. ft.)	282	162					
Calculated Top of Plug (ft.)	4100	0					
Measured Top of Plug (if tagged ft.)	N/A - future	N/A - future					
Slurry Wt. (Lb./Gal.)	TBD	TBD					
Type Cement or Other Material (Class III)	TBD	TBD					

LIST ALL OPEN HOLE AND/OR PERFORATED INTERVALS AND INTERVALS WHERE CASING WILL BE VARIED (if any)

From	To	From	To
4306	4330 (existing perfs)	5380	5390 (existing perfs)
4354	4374 (existing perfs)	5390	5410 (to be added for injection)
5045	5050 (existing perfs)		
5335	5360 (existing perfs)		

Estimated Cost to Plug Wells

TBD - cement type, volumes, density and type to be determined based on regulatory requirements and products in existence at time of plugging.

Certification

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibliity of fine and imprisonment. (Ref. 40 CFR 144.32)

Name and Official Title *(Please type or print)*	Signature	Date Signed

EPA Form 7520-14 (Rev. 12-11)

ATTACHMENT R

R. NECESSARY RESOURCES

IDAHO DEPARTMENT OF LANDS

This bond replaces and supersedes Aspen American Insurance Co Bond No. SU46286 effective March 28, 2016.

IDAHO OIL AND GAS CONSERVATION COMMISSION

BOND

Bond No. 1138356

Known all men by these presents, that we: Alta Mesa Services, LP of the County of Harris in the state of: Texas as principal, and Lexon Insurance Company of 10002 Shelbyville Rd, Suite 100, Louisville, KY 40223 as surety, authorized to do business in this State, are held and firmly bound unto the State in the penal sum as indicated, lawful money of the United States, for which payment, well and truly to be make, we bind ourselves, and each of us, and each of our heirs, executors, administrators or successors, and assigns jointly and severally, firmly by these presents.

The condition of this obligation is that whereas the above bounden principal proposes to drill a well or wells for oil, gas, or stratigraphic purposes in and upon the following described land situated within the State, to wit: *(May be used for blanket bond or for single well)*

See attached Exhibit "A"

NOW, THEREFORE, if the above bounden principal shall comply with all of the provisions of the laws of the State and the rules, regulations and orders of the Conservation Commission of the State, especially with reference to the proper plugging of said well or wells, and filing with the Oil and Gas Conservation commission of this State all notices and records required by said Commission, in the event said well or wells do not produce oil or gas in commercial quantities, or cease to produce oil or gas in commercial quantities, then this obligation is void; otherwise, the same shall be and remain in full force and effect.

Penal Sum of One Hundred Thousand and No/100 ($100,000.00)

Witness our hands and seals, this 28th day of March, 2016.

Principal: Alta Mesa Services, LP

Principal: [signature]
Michael A. McCabe, CFO

Witness our hands and seals, this 28th day of March, 2016.

Surety (print): Lexon Insurance Company

Surety(signature): Teresa D. Kelly
Teresa D. Kelly, Attorney-in-Fact

(If the principal is a corporation, the bond should be executed by its duly authorized officers, with the seal of the corporation affixed. When principal or surety executes this bond by agent, power of attorney or other evidence of authority must accompany the bond.)

Idaho Oil and Gas Conservation Commission

Approval Date: ____________

____
Secretary

POA #LX-264759

Form No. P-2

IDAHO DEPARTMENT OF LANDS

This bond replaces and supersedes Aspen American Insurance Company Bond No. SU46311 effective March 28, 2016.

State of Idaho
DEPARTMENT OF LANDS

Surety Bond Number 1136357

Lease/Plan/Permit No(s). See Attached Exhibit "A"

KNOW ALL MEN BY THESE PRESENTS, That we AM Idaho LLC, as principal and Lexon Insurance Company, a corporation organized under the laws of the State of Texas, and having its principal place of business in the State of Kentucky, in the City of Louisville, as surety are held and firmly bound unto the State of Idaho, in the sum of One Hundred Thousand------ dollars ($ 100,000.00) lawful money of the United States, conditioned on the payment of all damages to the surface and improvements thereon of lands described in the above lease/plan/permit specified and any outstanding balances as set forth in the lease/plan/permit. For such payment, well and truly to be made, we bind ourselves, our and each of our heirs, executors, administrators, successors and assignees, as the case may be, jointly and severally, firmly by these presents.

THE CONDITION of the foregoing obligation is such that:

WHEREAS, by lease/plan/permit bearing the above serial number, the lessee/plan holder/permittee was granted specific rights under and pursuant to Idaho Code title 58, chapters 1,3 and 6 or Idaho Code title 47, chapters 7, 8, 13, 15 or 16, and the pertinent rules and regulations of the Idaho State Board of Land Commissioners; and

WHEREAS, said lessee/plan holder/permittee has, by virtue of the lease/plan/permit above referred to, entered into certain covenants and agreements set forth in such lease/plan/permit, under which operations are to be conducted; and

WHEREAS, the said principal, in consideration of being permitted, in lieu of the lessee/plan holder/permittee, to furnish this bond agrees and by these presents does hereby bond himself to fulfill on behalf of the lessee/plan holder/permittee all of the obligations of the said lease/plan/permit in the same manner and to the same extent as though he were the lessee/plan holder/permittee. It is understood and agreed by the surety and the principal that if there is outstanding restoration obligations on the premises, or if outstanding payments are due, this bond shall extend to cover all acts for which restoration is required or payment of such outstanding amounts due, both prior to and subsequent to the date of this bond, until notified in writing by the Idaho Department of Lands that such requirements have been met or the bond has been replaced. The Idaho Department of Lands may require payment of the entire sum of this bond, or portions thereof, upon written notice to the surety, by the department, of the lessee/plan holder/permittee's failure to perform any obligations and/or pay any amounts due under the above referenced statutes and pertinent rules.

The surety shall pay to the Department of Lands the sum of this bond, or portions thereof, as requested by the department within 30 days of receipt of such written notice. In the event of a partial distribution, the remaining funds and liabilities shall not be released until the department notifies the surety, in writing, of release of remaining liability or requires payment of the remaining bond liabilities. Payment of the full sum of the bond to the department shall release the surety of all liabilities and obligations.

NOW THEREFORE, if the above principal shall in good faith observe, carry out and comply with all the laws now existing or hereafter enacted, designed or intended for the protection of the surface owner of said lands against damage and resulting loss caused by any operations carried on under said lease/plan/permit, or if any such damage and resulting loss shall so occur nevertheless, for which damage and loss reimbursement is required and made, then this obligation shall become void, otherwise to remain in full force and effect, and the liability of the surety under this bond for any one or more defaults of the principal under said lease/plan/permit shall not exceed in the aggregate the sum stated herein above; It is further provided, however, that the bond may be cancelled by the surety by the service of written notice of cancellation upon the Director of the Department of Lands of the State of Idaho, such cancellation to be effective at the expiration of ninety (90) days after the service of such cancellation notice by the surety on the Director by registered mail. Such cancellation notice, however, shall not affect any liability that shall have accrued under this bond prior to the effective date of cancellation.

Signed on this 28th day of March, 2016

(Signature of Principal) Michael A. McCabe, CFO
15021 Katy Frwy, Suite 400, Houston, TX 77094
(Business Address)

Teresa D Kelly
(Signature of Surety) Teresa D. Kelly, Attorney-in-Fact
10002 Shelbyville Rd, Suite 100, Louisville, KY 40223
(Business Address)

ACKNOWLEDGEMENT OF SURETY

State of Texas)
) ss
County of Harris)

On this 28th day of March, in the year 2016, before me Candace D. Bosheers, a Notary Public in and for the State of Texas, personally appeared Teresa D. Kelly, known to me to be the attorney-in-fact of the corporation that executed the instrument, or the person who executed the instrument on behalf of said corporation, and acknowledged to me that such corporation executed the same.

In Witness Whereof, I have hereunto set my hand and affixed my official seal of day and year first above written.

Candace Bosheers

Notary Public For Harris County, Texas
Residing at: 5444 Westheimer, Suite 900, Houston, TX 77056
My Commission expires January 24, 2020

POA #LX-264760

IDL 1801-29(26) 5-1-2002

ATTACHMENT S

S. **AQUIFER EXEMPTION FOR INJECTION ZONE** – See next three (3) pages for water analysis of the water produced from perforations at 5380 – 5390, which characterizes the water in the proposed injection zone. The depth of this zone, along with the presence of Benzene and other volatile organic compounds would limit or prevent the use of the water in this zone for aquifer uses.

Analytical Laboratories, Inc.
1804 N. 33rd Street
Boise, Idaho 83703
Phone (208) 342-5515

Attn: JEFF JANIK
ALTA MESA SERVICES, LP
15021 KATY FREEWAY STE 400
HOUSTON, TX 77094

Collected By: J JANIK
Submitted By: J JANIK

Perfs 5380 - 5390'

Source of Sample:
DJS PROP 2-14 PRODUCOD WATER

Time of Collection: 16:00
Date of Collection: 10/22/2014
Date Received: 10/23/2014
Report Date: 11/7/2014

Field Temp:
PWS:
Temp Rcvd in Lab: 20.4 °C
PWS Name

Laboratory Analysis Report

Sample Number: 1442245

NO FIELD TEMP GIVEN; NO TRAVEL BLANKS RCVD; Methane, Ethane, and Ethene testing were performed by Accutest Mountain States (AMS).

Test Requested	MCL	Analysis Result	Units	MDL	Method	Date Completed	Analyst
Aluminum, Al	UR	1.12	mg/L	0.10	EPA 200.7	10/24/2014	KC
Arsenic Low	0.01	< 0.005	mg/L	0.005	EPA 200.8	11/3/2014	JH
Barium, Ba	2	0.12	mg/L	0.05	EPA 200.7	10/24/2014	KC
Boron, B		7.40	mg/L	0.10	EPA 200.7	11/4/2014	KC
Calcium, Ca	UR	51.1	mg/L	0.50	EPA 200.7	10/28/2014	KC
Iron, Fe	UR	11.9	mg/L	0	EPA 200.7	10/29/2014	KC
Magnesium, Mg	UR	0.50	mg/L	0.50	EPA 200.7	10/28/2014	KC
Manganese Low		0.128	mg/L	0.005	EPA 200.7	10/24/2014	KC
Potassium, K	UR	56.7	mg/L	0.5	EPA 200.7	10/28/2014	KC
Selenium Low	0.05	< 0.005	mg/L	0.005	EPA 200.8	11/3/2014	JH
Silica	UR	106	mg/L	0.25	EPA 200.7	11/4/2014	KC
Sodium, Na	UR	392	mg/L	0.50	EPA 200.7	10/28/2014	KC
Uranium, U	30	< 5	ug/L	5	EPA 200.8	11/3/2014	JH
Metals Digestion		*			EPA 200.9-11	10/23/2014	JMS
Density		0.998	g/mL		Gravimetric	11/4/2014	JH
Nitrate (as N)		< 0.2	mg/L	0.2	EPA 300.0	10/23/2014	NC

MCL = Maximum Contamination Level
MDL = Method/Minimum Detection Limit
UR = Unregulated

 Date Report Printed: 11/7/2014 11:59:12

Laboratory Analysis Report

Sample Number: 1442245

NO FIELD TEMP GIVEN; NO TRAVEL BLANKS RCVD; Methane, Ethane, and Ethene testing were performed by Accutest Mountain States (AMS).

Test Requested	MCL	Analysis Result	Units	MDL	Method	Date Completed	Analyst
Benzene		1510	ug/L	0.5	EPA 8260B	10/28/2014	CY
Toluene		830	ug/L	0.5	EPA 8260B	10/28/2014	CY
Ethylbenzene		55.0	ug/L	0.5	EPA 8260B	10/28/2014	CY
Xylene, Total		390	ug/L	0.5	EPA 8260B	10/28/2014	CY
Methane		2.49	mg/L	0.0008	RSKSOP 175	10/27/2014	AMS
Ethane		0.399	mg/L	0.0016	RSKSOP 175	10/27/2014	AMS
Ethene		<0.0024	mg/L	0.0024	RSKSOP 175	10/27/2014	AMS
Alkalinity	UR	332	mg/L CaCO3		EPA 310.1	10/30/2014	CJS
Chloride, Cl	UR	305	mg/L	1	EPA 300.0	10/23/2014	NC
Fluoride, F	4.0	6.88	mg/L	0.10	EPA 300.0	10/23/2014	NC
Sulfate, SO4	UR	34	mg/L	1	EPA 300.0	10/23/2014	NC
pH	UR	8.8	S.U.		SM 4500-H B	10/23/2014	RME
Conductivity	UR	1,880	umhos	2	SM 2510B	10/23/2014	RME
Bicarbonate		302	mg/L		SM 2320	10/30/2014	CJS
Carbonate		29.8	mg/L		SM 2320	10/30/2014	CJS
Hydroxide		0.0	mg/L		SM 2320	10/30/2014	CJS
Resistivity		5.32	ohm*cm			10/23/2014	DS
Total Dissolved Solids	UR	1,540	mg/L	25	SM 2540C	10/28/2014	GM

MCL – Maximum Contamination Level
MDL – Method/Minimum Detection Limit
UR – Unregulated

Thank you for choosing Analytical Laboratories for your testing needs.
If you have any questions concerning this report,
please contact your client manager: James Hibbs

Page 2 of 2

Date Report Printed: 11/7/2014 11:59:12

Analytical Laboratories, Inc.
1804 N. 33rd Street
Boise, Idaho 83703
Phone (208) 342-5515

Data Report Printed: 11/21/2014 3:49:55 PM
http://www.analyticallaboratories.com
These test results relate only to the items tested.

Laboratory Analysis Report

Sample Number: 1442246

Attn: JEFF JANIK
ALTA MESA SERVICES, LP
15021 KATY FREEWAY STE 400
HOUSTON, TX 77094

Collected By: J JANIK
Submitted By: J JANIK

Source of Sample:
DJS PROP 2-14 PRODUCOD WATER

Time of Collection: 16:00
Date of Collection: 10/22/2014
Date Received: 10/23/2014
Report Date: 11/21/2014

PWS#:
PWS Name:

Field Temp: Temp Rcvd in Lab 20.4 °C

NO FIELD TEMP GIVEN; Radiological testing was performed by Summit Environmental (SUM).

Test Requested	MCL	Analysis Result	Units	MDL	Method	Date Completed	Analyst
Gross Alpha	15 pCi	<3	pCi/L	3	EPA 900.0	11/11/2014	SUM
Gross Beta		57+/-5.8	pCi/L	4	EPA 900.0	11/11/2014	SUM

Thank you for choosing Analytical Laboratories for your testing needs.
If you have any questions about this report, or any future analytical needs, please contact your client manager:
James Hibbs

MCL – Maximum Contamination Level
MDL – Method/Minimum Detection Limit
UR – Unregulated

Page 1 of 1

ATTACHMENT U

U. DESCRIPTION OF BUSINESS - Alta Mesa Services, LP is the operating subsidiary of Alta Mesa Holdings, LP. Alta Mesa Holdings, LP is a privately-held, independent exploration and production company, primarily engaged in the acquisition, exploration, development and production of oil, natural gas and natural gas liquids within the United States.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 155
Seattle, Washington 98101-3140

SEP 2 5 2018

OFFICE OF
COMPLIANCE AND ENFORCEMENT

Reply To: OCE-201

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Dale R. Hayes, VP Frontier Operations
Alta Mesa Services, LP
15021 Katy Freeway, Suite 400
Houston, Texas 77094

Re: Underground Injection Control (UIC) Permit Application No. ID2D001-A – First Notice

Dear Mr. Hayes,

The US Environmental Protection Agency ("EPA") received your Class II UIC permit application on October 16, 2017, at a time when the Idaho Department of Water Resources maintained primary enforcement authority over the Class II UIC program in Idaho. EPA was unable to act on Alta Mesa Services' ("AM Services") application until the completion of the state's voluntary Class II program transfer to EPA on July 30, 2018 (Federal Register Number 2018-16245). Shortly after, EPA contacted AM Services representatives to determine whether the Agency should act on your application as submitted, or if AM Services would like to submit additional information. Legal representatives from Marcus, Christian, Hardee & Davies, LLP contacted EPA on August 13, 2018, informing EPA that AM Services planned to submit supplemental information. We received this supplemental information by email from the above referenced legal representatives on September 11, 2018. We have reviewed your application (including the supplemental information) and determined that the material is incomplete, as specified at Chapter 40 of the Code of Federal Regulations (40 CFR) § 124.3(c). Under our permitting regulations, we cannot process your permit application until the application has met all applicable requirements. See 40 CFR § 124.3(a)(2).

Specifically, the following information is necessary to make your application complete:

- A listing of all EPA permits or construction approvals received or applied for, as required by 40 CFR §144.31(e)(6). This information is also requested by EPA's Form 7520-6, Underground Injection Control Permit Application (Attachment T).

- A list of the names and addresses of all owners of record of land within one-quarter mile of the facility (property) boundary, as required by 40 CFR §144.31(e)(9).

- A resubmission of the information provided by Marcus, Christian, Hardee & Davies, LLP on September 11, 2018, pursuant with applicable signatory requirements (40 CFR §144.32). Class II permit applications and information submitted with the intent of supplementing Class II permit applications must be signed and certified in a manner pursuant with sections 40 CFR §§ 144.32(a) and 144.32(d), respectively.

Please submit the information requested above by November 2, 2018. If you are unable to provide the information by this date, you may withdraw your application until you have all of the required information. Once you have all of the required information, you may resubmit it, along with the balance of your pending permit application, at any time. EPA will then review your submission for completeness. Please note that once an application is deemed complete, EPA may still request additional information when necessary to clarify, modify, or supplement previously submitted material.

Under EPA regulations, if an applicant fails or refuses to correct deficiencies in the application, the permit may be denied. If, by November 2, 2018, we do not receive the additional information, and if you do not withdraw your application, EPA may initiate the process to deny your permit application. See 40 CFR § 124.3(d).

Please note that, to ensure the protection of underground sources of drinking water, the Safe Drinking Water Act Section 1421 prohibits underground injection which is not authorized by rule or a permit issued by EPA or an authorized State. Safe Drinking Water Act, 42 U.S.C. 300h(b)(1)(A).

Thank you for your cooperation. If you have questions, please contact Evan Osborne (Osborne.evan@epa.gov, (206) 553-1747).

Sincerely,

for

Peter Contreras, Manager
Groundwater Unit

cc: David Ross
Assistant Administrator
USEPA Office of Water

From:	Richard Brown
To:	Osborne, Evan
Subject:	Application
Date:	Friday, September 14, 2018 1:18:36 PM

Evan— did Michael get back to yesterday?

Sent from my iPhone

From: Michael Christian
To: Thurmon, Clarke; Osborne, Evan; Richard Brown 2
Subject: Class II application
Date: Monday, August 13, 2018 1:54:45 PM

Clark,

Richard Brown let me know that Evan Osborne called him recently to ask whether we expect any significant modifications to the Class II application currently in EPA's hands. We appreciated Evan's reaching out to touch base. My client is working on some additional supporting information regarding proposed injection zone characteristics, which information I expect we will delivery to EPA in the next week or so, but it will not change the substance of the application. The only other issue is that because of recent changes in the corporate structure of the client, we are likely to change the name of the applicant from Alta Mesa Services, LP to AM Idaho, LLC. AM Idaho is the entity in which ownership of the producing wells in Idaho is held. If you have any thoughts regarding how you'd like that to be handled, please let me know. Otherwise I expect we'll formally note the change in applicant name by letter at the time we submit the additional supporting information.

Thanks,
Mike

Michael Christian
MARCUS, CHRISTIAN, HARDEE & DAVIES, LLP
737 N. 7th Street
Boise, ID 83702
(208) 342-3563
mchristian@mch-lawyer.com

From:	Contreras, Peter
To:	Osborne, Evan
Subject:	FW: Alta Mesa Service, LP Class II UIC application
Date:	Tuesday, October 03, 2017 2:07:14 PM
Attachments:	201709231015 EPA Class II Injection Permit Attachments.docx DJS 2_14 Regional Lacustrine Claystone Seal Map.ATTACHMENT G.pptx DJS 2-14 Proposed Injection Well Geology w Isopach.ATTACHMENT G.pptx Alta Mesa Wastewater Characteristics.ATTACHMENT H.docx DJS Properties 2-14 Inj Zone Capacity.ATTACHMENT H.xlsx DJS 2-14 Composite Log Updated.ATTACHMENT G.pptx DJS 2-14 Current Wellbore Diagram.ATTACHMENT M.xlsx DJS 2-14 Proposed Injector Wellbore Diagram.ATTACHMENT M.xlsx DJS 2-14 Proposed Injector Plugged Wellbore Diagram.ATTACHMENT Q.xlsx 20170905 drh mod EPA Form 7520-14_508c.ATTACHMENT Q.pdf 20141022 DJS 2-14 Water Analysis perfs 5380-90.ATTACHMENT S.pdf 170315039_HDEC march 2017 results.ATTACHMENT H SUPPORT.pdf 20160523.Tank battery sample may 2017.ATTACHMENT H SUPPORT.pdf Alta Mesa Service LP.UIC Permit Application.pdf

Peter Contreras | Ground Water Unit | EPA Region 10 Seattle | 206 553 6708

From: Michael Christian [mailto:mchristian@mch-lawyer.com]
Sent: Tuesday, October 03, 2017 12:14 PM
To: Contreras, Peter <Contreras.Peter@epa.gov>
Cc: Richard Brown <richard@weiserbrown.email>; Dale R. Hayes <dhayes@AltaMesa.net>; David M. Smith <dsmith@AltaMesa.net>; David Pepper <dpepper@AltaMesa.net>
Subject: Alta Mesa Service, LP Class II UIC application

Mr. Contreras:

Attached to this email are a UIC Permit Application, and required attachments, from Alta Mesa Service, LP for conversion of an existing oil and gas well in Idaho to a Class II injection well. A hard copy also has been mailed to you. I am also attaching the original digital files of some of the attachment items for clarity in viewing. Please let me know if you need further information.

Thanks,

Michael Christian
Marcus, Christian, Hardee & Davies LLP
737 N. 7th St.
Boise, ID 83702
(208) 342-3563
(208) 342-2170 (fax)

From:	Contreras, Peter
To:	Michael Christian
Cc:	Richard Brown; Dale R. Hayes; David M. Smith; David Pepper; Osborne, Evan; Werntz, James
Subject:	RE: Alta Mesa Service, LP Class II UIC application
Date:	Tuesday, October 03, 2017 2:05:09 PM

Mr. Christian,

Thank you for your submission.

As you may know, On August 25, 2017, Idaho requested that EPA initiate a process for EPA to administer the UIC Class II program in the state. We are currently working through the administrative process necessary to officially transfer the program to EPA, which will then allow us to legally issue a permit.

In anticipation of completing the voluntary transfer of the Class II program to EPA, we will begin reviewing the materials you have submitted and will contact you with any questions.

We look forward to working with you.

Peter Contreras
Manager, UST | UIC | DW Enforcement
US EPA Region 10
1200 6th Avenue, Suite 900, OCE-101
Seattle, WA 98101
(206) 553-6708 (desk)

From: Michael Christian [mailto:mchristian@mch-lawyer.com]
Sent: Tuesday, October 03, 2017 12:14 PM
To: Contreras, Peter <Contreras.Peter@epa.gov>
Cc: Richard Brown <richard@weiserbrown.email>; Dale R. Hayes <dhayes@AltaMesa.net>; David M. Smith <dsmith@AltaMesa.net>; David Pepper <dpepper@AltaMesa.net>
Subject: Alta Mesa Service, LP Class II UIC application

Mr. Contreras:

Attached to this email are a UIC Permit Application, and required attachments, from Alta Mesa Service, LP for conversion of an existing oil and gas well in Idaho to a Class II injection well. A hard copy also has been mailed to you. I am also attaching the original digital files of some of the attachment items for clarity in viewing. Please let me know if you need further information.

Thanks,

Michael Christian

Marcus, Christian, Hardee & Davies LLP
737 N. 7th St.
Boise, ID 83702
(208) 342-3563
(208) 342-2170 (fax)

From:	Richard Brown
To:	Osborne, Evan
Cc:	Michael Christian ; Chris Weiser ; Thurmon, Clarke
Subject:	RE: Alta Mesa Services being mailed today
Date:	Wednesday, September 26, 2018 10:06:38 AM

Evan-No need to speak and Michael is travelling today anyway. He and I just spoke and he hopes to have paperwork back to you within 24-48 hours. Thanks in advance-Richard

---

From: Osborne, Evan <Osborne.Evan@epa.gov>
Sent: Wednesday, September 26, 2018 11:55 AM
To: Richard Brown <richard@weiserbrown.email>
Cc: Michael Christian <mchristian@mch-lawyer.com>; Chris Weiser <chrisw@weiser-brown.com>; Thurmon, Clarke <Thurmon.Clarke@epa.gov>
Subject: RE: Alta Mesa Services being mailed today

Hi Richard,

Yes, I agree with your assessment. The application was nearly complete save a few items listed in the letter. Once we have those items we can move forward with our review. If you plan on calling with Michael, let's set up a time to talk so that Clarke (counsel on my side) can participate. If you'd like to call me without counsel I would be glad to take your call anytime.

Thanks,

Evan

From: Richard Brown [mailto:richard@weiserbrown.email]
Sent: Wednesday, September 26, 2018 5:40 AM
To: Osborne, Evan <Osborne.Evan@epa.gov>
Cc: Michael Christian <mchristian@mch-lawyer.com>; Chris Weiser <chrisw@weiser-brown.com>
Subject: RE: Alta Mesa Services being mailed today

Thanks Evan and I read through the letter. I understand we are basically missing two items. The first is a list of any EPA permits or construction approvals pending or permitted by Alta Mesa Services LP. We spoke about this on the phone 2-3 weeks ago and I thought we had cleaned that up but apparently not. The second is the list of interested parties within a ¼ mile of the boundary of the proposed facility. My recollection is there are not any other owners within a ¼ mile and that ML Investment Company is the only owner within the ¼ mile parameter. They also own all the ground that the application facility sits on. There might be a third issue and confusion as to the applicant name and signatory party on the application? I'm getting with Michael this morning and we might give you a call before lunch. Regards-Richard

---

From: Osborne, Evan <Osborne.Evan@epa.gov>
Sent: Tuesday, September 25, 2018 8:01 PM

To: Richard Brown <richard@weiserbrown.email>
Subject: FW: Alta Mesa Services being mailed today

Hi Richard,

This notice is on its way to Alta Mesa Services. I would be glad to speak with you if you to answer any questions you may have. Please contact me and we can arrange a time to talk.

Evan

From: Thompson, Cesley
Sent: Tuesday, September 25, 2018 5:54 PM
To: Osborne, Evan <Osborne.Evan@epa.gov>
Cc: Ross, David P <ross.davidp@epa.gov>
Subject: Alta Mesa Services being mailed today

Thank you,

Cesley Thompson
Administrative Specialist
Office of Compliance and Enforcement
US EPA Region 10
1200 6th Ave, Ste. 155
Seattle, WA 98101
M/S OCE-201
(206) 553-5116

From:	Richard Brown
To:	Osborne, Evan
Cc:	Michael Christian ; Chris Weiser
Subject:	RE: Alta Mesa Services being mailed today
Date:	Wednesday, September 26, 2018 5:41:04 AM

Thanks Evan and I read through the letter. I understand we are basically missing two items. The first is a list of any EPA permits or construction approvals pending or permitted by Alta Mesa Services LP. We spoke about this on the phone 2-3 weeks ago and I thought we had cleaned that up but apparently not. The second is the list of interested parties within a ¼ mile of the boundary of the proposed facility. My recollection is there are not any other owners within a ¼ mile and that ML Investment Company is the only owner within the ¼ mile parameter. They also own all the ground that the application facility sits on. There might be a third issue and confusion as to the applicant name and signatory party on the application? I'm getting with Michael this morning and we might give you a call before lunch. Regards-Richard

From: Osborne, Evan <Osborne.Evan@epa.gov>
Sent: Tuesday, September 25, 2018 8:01 PM
To: Richard Brown <richard@weiserbrown.email>
Subject: FW: Alta Mesa Services being mailed today

Hi Richard,

This notice is on its way to Alta Mesa Services. I would be glad to speak with you if you to answer any questions you may have. Please contact me and we can arrange a time to talk.

Evan

From: Thompson, Cesley
Sent: Tuesday, September 25, 2018 5:54 PM
To: Osborne, Evan <Osborne.Evan@epa.gov>
Cc: Ross, David P <ross.davidp@epa.gov>
Subject: Alta Mesa Services being mailed today

Thank you,

Cesley Thompson
Administrative Specialist
Office of Compliance and Enforcement
US EPA Region 10
1200 6th Ave, Ste. 155
Seattle, WA 98101
M/S OCE-201
(206) 553-5116

From:	Richard Brown
To:	Osborne, Evan
Cc:	Michael Christian ; Chris Weiser ; Thurmon, Clarke
Subject:	RE: Alta Mesa Services being mailed today
Date:	Wednesday, September 26, 2018 10:12:24 AM

Evan-FYI and I misspoke this morning about the ¼ mile owner and name is DJS Properties LLLP rather than ML Investments. Both are Simplot family entities. Mike will set this out when he forwards the other info. Regards-Richard

From: Osborne, Evan <Osborne.Evan@epa.gov>
Sent: Wednesday, September 26, 2018 11:55 AM
To: Richard Brown <richard@weiserbrown.email>
Cc: Michael Christian <mchristian@mch-lawyer.com>; Chris Weiser <chrisw@weiser-brown.com>; Thurmon, Clarke <Thurmon.Clarke@epa.gov>
Subject: RE: Alta Mesa Services being mailed today

Hi Richard,

Yes, I agree with your assessment. The application was nearly complete save a few items listed in the letter. Once we have those items we can move forward with our review. If you plan on calling with Michael, let's set up a time to talk so that Clarke (counsel on my side) can participate. If you'd like to call me without counsel I would be glad to take your call anytime.

Thanks,

Evan

From: Richard Brown [mailto:richard@weiserbrown.email]
Sent: Wednesday, September 26, 2018 5:40 AM
To: Osborne, Evan <Osborne.Evan@epa.gov>
Cc: Michael Christian <mchristian@mch-lawyer.com>; Chris Weiser <chrisw@weiser-brown.com>
Subject: RE: Alta Mesa Services being mailed today

Thanks Evan and I read through the letter. I understand we are basically missing two items. The first is a list of any EPA permits or construction approvals pending or permitted by Alta Mesa Services LP. We spoke about this on the phone 2-3 weeks ago and I thought we had cleaned that up but apparently not. The second is the list of interested parties within a ¼ mile of the boundary of the proposed facility. My recollection is there are not any other owners within a ¼ mile and that ML Investment Company is the only owner within the ¼ mile parameter. They also own all the ground that the application facility sits on. There might be a third issue and confusion as to the applicant name and signatory party on the application? I'm getting with Michael this morning and we might give you a call before lunch. Regards-Richard

From: Osborne, Evan <Osborne.Evan@epa.gov>

Sent: Tuesday, September 25, 2018 8:01 PM
To: Richard Brown <richard@weiserbrown.email>
Subject: FW: Alta Mesa Services being mailed today

Hi Richard,

This notice is on its way to Alta Mesa Services. I would be glad to speak with you if you to answer any questions you may have. Please contact me and we can arrange a time to talk.

Evan

From: Thompson, Cesley
Sent: Tuesday, September 25, 2018 5:54 PM
To: Osborne, Evan <Osborne.Evan@epa.gov>
Cc: Ross, David P <ross.davidp@epa.gov>
Subject: Alta Mesa Services being mailed today

Thank you,

Cesley Thompson
Administrative Specialist
Office of Compliance and Enforcement
US EPA Region 10
1200 6th Ave, Ste. 155
Seattle, WA 98101
M/S OCE-201
(206) 553-5116

From:	Richard Brown
To:	Osborne, Evan
Cc:	Michael Christian
Subject:	RE: Application
Date:	Friday, September 14, 2018 3:00:15 PM

Evan-Thanks for the heads up. Michael and I have been working on this water disposal issue together for a long time. As to permit questions, please email him but copy me. Have a great weekend-Richard

-----Original Message-----
From: Osborne, Evan <Osborne.Evan@epa.gov>
Sent: Friday, September 14, 2018 3:36 PM
To: Richard Brown <richard@weiserbrown.email>
Subject: RE: Application

Hi Richard,

Mike emailed me today. Thanks for checking. I will follow-up with any questions.

In the future, would you like me to come to you or Michael with questions about the permit? (For example, if we request additional materials down the line).

Evan

-----Original Message-----
From: Richard Brown [mailto:richard@weiserbrown.email]
Sent: Friday, September 14, 2018 1:18 PM
To: Osborne, Evan <Osborne.Evan@epa.gov>
Subject: Application

Evan— did Michael get back to yesterday?

Sent from my iPhone

From:	Richard Brown
To:	Osborne, Evan
Cc:	Michael Christian; Thurmon, Clarke
Subject:	Re: Class II application
Date:	Tuesday, September 04, 2018 7:19:52 PM

Evan-I am quite surprised that you haven't received the nominally amended application. I'm going to get to the bottom of this first thing in the morning and report back. Thanks for reaching out to me -RICHARD

Sent from my iPhone

On Sep 4, 2018, at 6:56 PM, Osborne, Evan <Osborne.Evan@epa.gov> wrote:

> Richard,
>
> I spoke to you last month about the status of Alta Mesa's (AM) permit application. Thank you for working with Mike to share the information, below. We haven't heard back from Alta Mesa since receiving this email indicating that your company was preparing additional supporting information. Does AM still intends on submitting this information? Also, would AM like EPA to hold off on reviewing the permit application in depth until this additional information is submitted?
>
> Thank you,
>
> Evan
>
> ---
>
> **From:** Michael Christian [mailto:mchristian@mch-lawyer.com]
> **Sent:** Monday, August 13, 2018 1:55 PM
> **To:** Thurmon, Clarke <Thurmon.Clarke@epa.gov>; Osborne, Evan <Osborne.Evan@epa.gov>; Richard Brown 2 <richard@weiserbrown.email>
> **Subject:** Class II application
>
> Clark,
>
> Richard Brown let me know that Evan Osborne called him recently to ask whether we expect any significant modifications to the Class II application currently in EPA's hands. We appreciated Evan's reaching out to touch base. My client is working on some additional supporting information regarding proposed injection zone characteristics, which information I expect we will delivery to EPA in the next week or so, but it will not change the substance of the application. The only other issue is that because of recent changes in the corporate structure of the client, we are likely to change the name of the applicant from Alta Mesa Services, LP to AM Idaho, LLC. AM Idaho is the entity in which ownership of the producing wells in Idaho is held. If you have any thoughts regarding how you'd like that to be handled, please let me know. Otherwise I expect

we'll formally note the change in applicant name by letter at the time we submit the additional supporting information.

Thanks,
Mike

Michael Christian
MARCUS, CHRISTIAN, HARDEE & DAVIES, LLP
737 N. 7th Street
Boise, ID 83702
(208) 342-3563
mchristian@mch-lawyer.com

From: Richard Brown
To: Osborne, Evan; Michael Christian; Thurmon, Clarke
Subject: RE: Class II application
Date: Wednesday, September 05, 2018 7:52:27 AM

Evan-I heard from Michael Christian this morning that the minor revisions would be to you in the next couple of days. As they are not substantive, I'd say go ahead and start the review but defer to Michael? Thanks for reaching out-Richard

From: Osborne, Evan <Osborne.Evan@epa.gov>
Sent: Tuesday, September 4, 2018 7:56 PM
To: Michael Christian <mchristian@mch-lawyer.com>; Thurmon, Clarke <Thurmon.Clarke@epa.gov>; Richard Brown <richard@weiserbrown.email>
Subject: RE: Class II application

Richard,

I spoke to you last month about the status of Alta Mesa's (AM) permit application. Thank you for working with Mike to share the information, below. We haven't heard back from Alta Mesa since receiving this email indicating that your company was preparing additional supporting information. Does AM still intends on submitting this information? Also, would AM like EPA to hold off on reviewing the permit application in depth until this additional information is submitted?

Thank you,

Evan

From: Michael Christian [mailto:mchristian@mch-lawyer.com]
Sent: Monday, August 13, 2018 1:55 PM
To: Thurmon, Clarke <Thurmon.Clarke@epa.gov>; Osborne, Evan <Osborne.Evan@epa.gov>; Richard Brown 2 <richard@weiserbrown.email>
Subject: Class II application

Clark,

Richard Brown let me know that Evan Osborne called him recently to ask whether we expect any significant modifications to the Class II application currently in EPA's hands. We appreciated Evan's reaching out to touch base. My client is working on some additional supporting information regarding proposed injection zone characteristics, which information I expect we will delivery to EPA in the next week or so, but it will not change the substance of the application. The only other issue is that because of recent changes in the corporate structure of the client, we are likely to change the name of the applicant from Alta Mesa Services, LP to AM Idaho, LLC. AM Idaho is the entity in which ownership of the producing wells in Idaho is held. If you have any thoughts regarding how you'd like that to be handled, please let me know. Otherwise I expect we'll formally note the change in applicant name by letter at the time we submit the additional supporting information.

Thanks,
Mike

Michael Christian
MARCUS, CHRISTIAN, HARDEE & DAVIES, LLP
737 N. 7th Street
Boise, ID 83702
(208) 342-3563
mchristian@mch-lawyer.com

From: Richard Brown
To: Osborne, Evan
Subject: Re: Class II application
Date: Wednesday, September 05, 2018 2:34:48 PM

---

please do Evan and we'll talk soon

Sent from my iPhone

On Sep 5, 2018, at 10:08 AM, Osborne, Evan <Osborne.Evan@epa.gov> wrote:

> Got it – thanks for looking into it. I'll keep an eye out and let you know when it's received.
>
> Evan
>
> ---
>
> **From:** Richard Brown [mailto:richard@weiserbrown.email]
> **Sent:** Wednesday, September 05, 2018 7:52 AM
> **To:** Osborne, Evan <Osborne.Evan@epa.gov>; Michael Christian <mchristian@mch-lawyer.com>; Thurmon, Clarke <Thurmon.Clarke@epa.gov>
> **Subject:** RE: Class II application
>
> Evan-I heard from Michael Christian this morning that the minor revisions would be to you in the next couple of days. As they are not substantive, I'd say go ahead and start the review but defer to Michael? Thanks for reaching out-Richard
>
> ---
>
> **From:** Osborne, Evan <Osborne.Evan@epa.gov>
> **Sent:** Tuesday, September 4, 2018 7:56 PM
> **To:** Michael Christian <mchristian@mch-lawyer.com>; Thurmon, Clarke <Thurmon.Clarke@epa.gov>; Richard Brown <richard@weiserbrown.email>
> **Subject:** RE: Class II application
>
> Richard,
>
> I spoke to you last month about the status of Alta Mesa's (AM) permit application. Thank you for working with Mike to share the information, below. We haven't heard back from Alta Mesa since receiving this email indicating that your company was preparing additional supporting information. Does AM still intends on submitting this information? Also, would AM like EPA to hold off on reviewing the permit application in depth until this additional information is submitted?
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> Thank you,
>
> Evan

From: Michael Christian [mailto:mchristian@mch-lawyer.com]
Sent: Monday, August 13, 2018 1:55 PM
To: Thurmon, Clarke <Thurmon.Clarke@epa.gov>; Osborne, Evan <Osborne.Evan@epa.gov>; Richard Brown 2 <richard@weiserbrown.email>
Subject: Class II application

Clark,

Richard Brown let me know that Evan Osborne called him recently to ask whether we expect any significant modifications to the Class II application currently in EPA's hands. We appreciated Evan's reaching out to touch base. My client is working on some additional supporting information regarding proposed injection zone characteristics, which information I expect we will delivery to EPA in the next week or so, but it will not change the substance of the application. The only other issue is that because of recent changes in the corporate structure of the client, we are likely to change the name of the applicant from Alta Mesa Services, LP to AM Idaho, LLC. AM Idaho is the entity in which ownership of the producing wells in Idaho is held. If you have any thoughts regarding how you'd like that to be handled, please let me know. Otherwise I expect we'll formally note the change in applicant name by letter at the time we submit the additional supporting information.

Thanks,
Mike

Michael Christian
MARCUS, CHRISTIAN, HARDEE & DAVIES, LLP
737 N. 7th Street
Boise, ID 83702
(208) 342-3563
mchristian@mch-lawyer.com

From: Osborne, Evan
To: "Michael Christian"; Thurmon, Clarke
Subject: RE: Class II UIC permit application
Date: Friday, September 14, 2018 9:50:00 AM

Mike,

Thank you for reaching out. We will contact you with any other requests for information.

Evan

From: Michael Christian [mailto:mchristian@mch-lawyer.com]
Sent: Friday, September 14, 2018 9:33 AM
To: Osborne, Evan <Osborne.Evan@epa.gov>; Thurmon, Clarke <Thurmon.Clarke@epa.gov>
Subject: RE: Class II UIC permit application

Evan ---

I received a call from Richard Brown yesterday. He indicated you'd called him with a question about whether the applicant owns any other permitted Class II injection wells. AM Idaho LLC does not own any such wells. It does own producing oil and gas wells, all of them in Idaho. Please let me know if you need any other information.

Thanks,
Mike

Michael Christian
MARCUS, CHRISTIAN, HARDEE & DAVIES, LLP
737 N. 7th Street
Boise, ID 83702
(208) 342-3563
mchristian@mch-lawyer.com

From: Michael Christian
Sent: Tuesday, September 11, 2018 8:09 AM
To: 'Osborne, Evan' <Osborne.Evan@epa.gov>; 'Thurmon, Clarke' <Thurmon.Clarke@epa.gov>
Subject: Class II UIC permit application

Evan, Clarke:

Attached are:

1. A letter to you describing the additional information being submitted in support of my client's Class II permit application, and including a longer discussion of the aquifer exemption request;
2. A modified version of Attachments A-U, to replace the previous set of attachments provided to you;
3. A copy of a February 1, 2018 letter from me to Barry Burnell of the Idaho Department of Environmental Quality, discussing facts supporting aquifer exemption; and
4. Copies of the attachments referenced in the IDEQ letter.

Please let me know if you have any questions about any of the above.

Thanks,
Mike

Michael Christian
MARCUS, CHRISTIAN, HARDEE & DAVIES, LLP
737 N. 7th Street
Boise, ID 83702
(208) 342-3563
mchristian@mch-lawyer.com

From: Michael Christian
To: Osborne, Evan; Thurmon, Clarke
Subject: RE: Class II UIC permit application
Date: Friday, September 14, 2018 9:38:40 AM

Evan ---

I received a call from Richard Brown yesterday. He indicated you'd called him with a question about whether the applicant owns any other permitted Class II injection wells. AM Idaho LLC does not own any such wells. It does own producing oil and gas wells, all of them in Idaho. Please let me know if you need any other information.

Thanks,
Mike

Michael Christian
MARCUS, CHRISTIAN, HARDEE & DAVIES, LLP
737 N. 7th Street
Boise, ID 83702
(208) 342-3563
mchristian@mch-lawyer.com

From: Michael Christian
Sent: Tuesday, September 11, 2018 8:09 AM
To: 'Osborne, Evan' <Osborne.Evan@epa.gov>; 'Thurmon, Clarke' <Thurmon.Clarke@epa.gov>
Subject: Class II UIC permit application

Evan, Clarke:

Attached are:

1. A letter to you describing the additional information being submitted in support of my client's Class II permit application, and including a longer discussion of the aquifer exemption request;
2. A modified version of Attachments A-U, to replace the previous set of attachments provided to you;
3. A copy of a February 1, 2018 letter from me to Barry Burnell of the Idaho Department of Environmental Quality, discussing facts supporting aquifer exemption; and
4. Copies of the attachments referenced in the IDEQ letter.

Please let me know if you have any questions about any of the above.

Thanks,
Mike

Michael Christian
MARCUS, CHRISTIAN, HARDEE & DAVIES, LLP
737 N. 7th Street
Boise, ID 83702
(208) 342-3563
mchristian@mch-lawyer.com

From: Michael Christian
To: Osborne, Evan; Thurmon, Clarke
Subject: RE: UIC Permit Application No. ID2D001-A
Date: Friday, October 05, 2018 10:45:35 AM

Thanks Evan. Have a great weekend.

From: Osborne, Evan <Osborne.Evan@epa.gov>
Sent: Friday, October 5, 2018 11:25 AM
To: Michael Christian <mchristian@mch-lawyer.com>; Thurmon, Clarke <Thurmon.Clarke@epa.gov>
Subject: RE: UIC Permit Application No. ID2D001-A

Mike,

Ah, of course – my oversight. Thanks for letting me know.

We will be in contact shortly.

Best,

Evan

From: Michael Christian [mailto:mchristian@mch-lawyer.com]
Sent: Friday, October 05, 2018 10:18 AM
To: Osborne, Evan <Osborne.Evan@epa.gov>; Thurmon, Clarke <Thurmon.Clarke@epa.gov>
Subject: RE: UIC Permit Application No. ID2D001-A

Evan,

That information is included in my letter to you of yesterday's date, attached to my email of yesterday (see near the end of the letter, after the numbered list). As is set forth in the letter, the only owner is:

DJS Properties LLLP
Attn: Michael Simplot
10418 W. Emerald St., Suite 101
Boise, ID 83704

Let me know if you need it in another format.

Thanks,
Mike

From: Osborne, Evan <Osborne.Evan@epa.gov>
Sent: Friday, October 5, 2018 10:52 AM

To: Michael Christian <mchristian@mch-lawyer.com>; Thurmon, Clarke <Thurmon.Clarke@epa.gov>
Subject: RE: UIC Permit Application No. ID2D001-A

Mike,

Thank you for submitting this additional information needed to provide a complete application. After an initial review I haven't found a response to EPA's request for, "A list of the names and addresses of all owners of record of land within one-quarter mile of the facility (property) boundary, as required by 40 CFR §144.31(e)(9)." Does AM Idaho intend on submitting this information? Once EPA has received a complete application, the Agency can begin a technical review of the permit application.

Best Regards,

Evan

From: Michael Christian [mailto:mchristian@mch-lawyer.com]
Sent: Thursday, October 04, 2018 2:33 PM
To: Osborne, Evan <Osborne.Evan@epa.gov>; Thurmon, Clarke <Thurmon.Clarke@epa.gov>
Subject: UIC Permit Application No. ID2D001-A

Evan –

Attached to this email, please find the following in follow up to your letter to Dale Hayes dated September 25, 2018:

1. My letter to you of today's date setting out the additional information being supplied or resubmitted;

2. A revised EPA Form 7520-6 reflecting that AM Idaho LLC is the applicant owner and operator, signed by a responsible corporate office, F. David Murrell, who is the Vice President of Land for AM Idaho LLC.

3. As Attachment T to the application, a listing of all other related permits or construction approvals as required under 40 CFR 144.31(6), specifically, air program permits to construct issued by the Idaho Department of Environmental Quality for four oil and gas wells and one oil and gas gathering facility in Payette County, Idaho owned by AM Idaho LLC.

4. Resubmittal of the materials previously provided by me on September 11, 2018, including:

    a. My letter of that date;
    b. The revised Attachments A-U submitted with that letter;
    c. A copy of a February 1, 2018 letter from me to Barry Burnell of the Idaho Department of Environmental Quality, discussing facts supporting aquifer exemption; and

d. Copies of the attachments referenced in the IDEQ letter.

5. A certification pursuant to 40 CFR 144.32(d), signed by F. David Murrell, Vice President of Lands of AM Idaho LLC as responsible corporate officer regarding the documents listed in items 3 and 4, above, and regarding my letter of today's date.

Please let me know if you have any questions or need additional information.

Thanks,
Mike

Michael Christian
MARCUS, CHRISTIAN, HARDEE & DAVIES, LLP
737 N. 7th Street
Boise, ID 83702
(208) 342-3563
mchristian@mch-lawyer.com